



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

MBA PROFESSIONAL REPORT

**Analysis of Logistics Differences within the
European Union with Recommendations for
Turkey as a Candidate**

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Mehmet Turk**

June 2006

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REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE June 2006	3. REPORT TYPE AND DATES COVERED MBA Professional Report	
4. TITLE AND SUBTITLE: Analysis of Logistics Differences within the European Union with Recommendations for Turkey as a Candidate			5. FUNDING NUMBERS	
6. AUTHOR(S) Petr Skalak and Mehmet Turk				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING / MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this report are those of the author(s) and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE	
13. ABSTRACT (maximum 200 words) With the accession of the new states to the European Union, it became a huge entity that includes members having great differences in many fields. Despite many regulations that have been applied to standardize the systems of those countries, there are still areas with diverse applications. One of the fields in which significant differences are observed is the area of logistics. The purpose of this study is to provide a guide for EU candidates that demonstrates ways to improve and unify their logistics systems in accordance with EU requirements. The study presents the analysis of logistics disparities in different regions of the EU and what EU policies and regulations are trying to avoid their negative effects, and finally it analyses Turkey as a model for other candidate countries. So, after studying the effects of different logistics applications within the Union, they can judge themselves in comparison with Turkey.				
14. SUBJECT TERMS European Union, Turkey, Logistics, Regional Differences, Intermodal Transportation, Regulations and Policy, Candidates			15. NUMBER OF PAGES 123	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)
Prescribed by ANSI Std. Z39-18

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**ANALYSIS OF LOGISTICS DIFFERENCES WITHIN THE EUROPEAN UNION
WITH RECOMMENDATIONS FOR TURKEY AS A CANDIDATE**

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Submitted in partial fulfillment of the requirements for the degree of

MASTER OF BUSINESS ADMINISTRATION

from the

**NAVAL POSTGRADUATE SCHOOL
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ANALYSIS OF LOGISTICS DIFFERENCES WITHIN THE EUROPEAN UNION WITH RECOMMENDATIONS FOR TURKEY AS A CANDIDATE

ABSTRACT

With the accession of the new states to the European Union, it became a huge entity that includes members having great differences in many fields. Despite many regulations that have been applied to standardize the systems of those countries, there are still areas with diverse applications. One of the fields in which significant differences are observed is the area of logistics. The purpose of this study is to provide a guide for EU candidates that demonstrates ways to improve and unify their logistics systems in accordance with EU requirements. The study presents the analysis of logistics disparities in different regions of the EU and what EU policies and regulations are trying to avoid their negative effects, and finally it analyses Turkey as a model for other candidate countries. So, after studying the effects of different logistics applications within the Union, they can judge themselves in comparison with Turkey.

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ACKNOWLEDGMENTS

We wish to thank our lead advisor, Professor Geraldo Ferrer, for his unwavering support since the first day of our project. His professionalism and knowledge of European Union issues were invaluable. In addition, we appreciate Professor Uday Apte for his remarkable inputs to our project.

Petr would like to thank representatives of the Armed Forces of the Czech Republic, especially Major General Pavel Jevula, who enabled him to complete his education at the Naval Postgraduate School.

Mehmet would like to thank all those who contributed to his education, especially the Turkish Armed Forces, for giving him this academic opportunity. He would also like to offer a very special thanks to his wife, Ozden. She has been a source of love and energy for him, during a very intense period, as he developed this project.

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I. INTRODUCTION

A. BACKGROUND

The European Union's name comes from the Treaty of European Union, which was ratified in November 1993. The Union is an economic and political confederation of European nations and other organizations that are responsible for a common foreign and security policy and for cooperation on justice and home affairs. There are twenty-five full-member states in the European Union (EU): Austria (AT), Belgium (BE), Cyprus (CP), the Czech Republic (CZ), Denmark (DK), Estonia (ES), Finland (FI), France (FR), Germany (DE), Great Britain (UK), Greece (GR), Hungary (HU), Ireland (IE), Italy (IT), Latvia (LV), Lithuania (LT), Luxembourg (LUX), Malta (ML), the Netherlands (NL), Poland (PL), Portugal (PT), Slovakia (SK), Slovenia (SL), Spain (ES), and Sweden (SE).

In 2003, the EU and ten (at that time) non-EU nations signed treaties that resulted in the largest expansion of the EU the following year: Estonia, Latvia, Lithuania, Poland, the Czech Republic, Slovakia, Hungary, Slovenia, Cyprus, and Malta. This increased the EU's population by 20 percent and its land area by 23 percent. Most of the newer members are significantly poorer than the largely European older members.¹

The road to this enlargement started in 1989 with the fall of the Berlin Wall and "the Iron Curtain." The EU set up the "PHARE" program of financial assistance, designed to help the young democracies rebuild their economies and to encourage political reform. On June 22, 1993, in Copenhagen, the European Council stated for the first time that prospective countries in central and eastern Europe that "so desire shall become members of the European Union." At the same time, the European Council established three major criteria—including political, economic, and membership obligations—that candidate countries must meet before they can join the EU:

1. Political: Candidate countries must have stable institutions guaranteeing democracy, the rule of law, human rights, and respect for and protection of minorities.

¹ *European Union: Evolution* [Web site]; available from http://www.answers.com/topic/european-union#after_ad1, Internet; accessed 18 February 2006.

2. Economic: Candidate countries must have a functioning market economy and be able to cope with competitive pressure and market forces within the Union.
3. Membership obligations: Candidate countries must be able to take on the obligations of EU membership, including adherence to its aims of political, economic, and monetary union. This means candidate countries must adopt the entire body of EU law.²

Following that announcement, the EU began negotiations with ten central and eastern European countries, plus Cyprus and Malta. Those negotiations were completed in Copenhagen on December 13, 2002. Before accession, each country had to pass national laws and the legislation had also to be applied in practice. The European Union was concerned to ensure that enlargement on this scale would not turn the Union into merely a free-trade area and that the resulting continent-wide family of nations could work together efficiently and effectively. Therefore, it organized a Convention to discuss Europe's future and to draft a Constitution for the new EU of twenty-five countries. The European Council agreed to the final text of the Constitution in 2004.

Next, the European Council took one of the most momentous steps in the history of European unification. On May 1, 2004, it decided to welcome ten more countries to join the EU: Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia. In making this decision, the European Union not only increased its surface area and its population, but also put an end to the split in the continent—a rift that from 1945 onward had separated the free world from the communist world. So this, the fifth enlargement of the EU, had also a political and moral dimension. Both geographically and in terms of their culture, their history, and their aspirations, in joining the European Union they were joining the democratic European family and taking their full part in the great project conceived by the EU's founding countries. The accession treaties, signed in Athens on April 16, 2003, allowed the people

² *European Council in Copenhagen 21-22 June 1993: Conclusions of the Presidency* [publication online]; available from http://ue.eu.int/ueDocs/cms_Data/docs/pressData/en/ec/72921.pdf; Internet; accessed 19 February 2006.

of the new member states to stand for election and to vote, on the same terms as all other EU citizens, in the European parliamentary elections of June 2004.³

If all goes according to the plans agreed to in Copenhagen, the enlarged EU of twenty-five countries and 454 million people will expand even further in 2007 with the accession of Bulgaria and Romania. Also, the European Council has decided to move ahead with procedures related to the possible membership of Croatia and Turkey. Already in 1999 the Helsinki European Council had decided that “Turkey is a candidate State destined to join the Union on the basis of the same criteria as applied to the other candidate States.” Turkey is a member of NATO and the Council of Europe. It has had an association agreement with the EU since 1964 and has been an applicant for EU membership since 1987. But Turkey lies on the very edge of the European continent, and the prospect of its joining the EU raises questions about where to draw the ultimate boundaries of the European Union.⁴

With the accession of the new states to the European Union, it became a huge entity that includes members having great differences in many fields. Despite many regulations that have been applied to standardize the systems of those countries, there are still areas with diverse applications. One of the fields in which significant differences are observed is the area of logistics. After the integration of the ten new members, most of which used ex-Soviet systems in many fields, the differences became more significant. From a logistics perspective, it is easy to find similar differences among western Europeans as well.

B. PURPOSE

The purpose of this study is to provide a guide for EU candidates which demonstrates ways to improve and unify their logistics systems in accordance with EU requirements. Those candidates could benefit from this project by learning about the logistics differences among the member states of the European Union (EU) and the policies and regulations on the improvement of the EU’s logistics system, and finally by

³ *European Council in Copenhagen 21-22 June 1993: Conclusions of the Presidency.*

⁴ *Enlargement* [Web site]; available from http://europa.eu.int/abc/12lessons/index3_en.htm; Internet; accessed 21 February 2006.

taking Turkey, which is one of candidate, as a model. So, after studying the effects of different logistics applications within the Union, they can judge themselves in comparison with Turkey.

C. SCOPE

The thesis focuses on describing the regional differences within the EU and their impact on logistics, the EU regulations and policies that affect Turkey's and other prospective members' possible membership, and the ways that Turkey and other prospective countries can integrate their logistics systems into the current and any future unified EU logistics system.

D. METHODOLOGY

In order to provide EU candidates with the understanding of how their logistics systems should look like when they become a member, this study presents the analysis of logistics disparities in different regions of the EU. It examines those EU policies and regulations that are trying to avoid negative effects. Finally, it analyzes Turkey as a model for other candidate countries.

To analyze regional differences within the EU's logistics arena, we conducted our research in five main areas, in accordance with the categorization developed by David Simchi-Levi (Massachusetts Institute of Technology, Cambridge, Massachusetts), Philip Kaminsky (University of California, Berkeley), and Edith Simchi-Levi (Logic Tools, Inc., Lexington, Massachusetts).

1. Culture
2. Infrastructure and Transportation
3. Performance Expectations
4. Information Technologies
5. Human Resources

Simchi-Levi, Kaminsky, and Simchi-Levi designed the categorization originally for studying global regional differences; we implemented almost the same idea for the European Union. We changed the second component slightly by adding "transportation" to what originally was only "infrastructure." We did this to emphasize transportation because it constitutes the largest logistics difference among EU member states and

because an intermodal transportation capability is the most important enabler of effective European logistics operations. Land, rail, and inland water transportation modes are therefore discussed in the thesis as the primary parts of the EU's intermodal transportation network.

After our discussion of regional differences, we have mined and demonstrated the EU's policies and regulations pertaining to the five components of logistics operations, as they are the mechanisms to fill any gaps. Due to the huge number of regulations and policy declarations by the EU agencies about logistics issues, we summarize the general understanding in addition to detailed information about the weightier issues.

Turkey was selected as the model country among the EU candidates, since it has the largest economy and its strategic location is of great importance for the EU as a bridge between the different continents and trade zones. Turkey's current logistics implementations and infrastructure are analyzed under the guidance of preceding chapters. The earlier chapters focus on the disparities that comprise problems and the regulations that have been implemented by the EU to improve those inefficiencies. We accentuate Turkey's transportation system, since it is Turkey's greatest logistics challenge in its efforts to join the European Union. We chose two major areas, rail and land transportation, to show a comparison with the EU's current intermodal transportation infrastructure and policies. Of all the EU members and candidate states, Turkey has the biggest truck and bus fleet. Its rail infrastructure, however, is one of the worst, and this in an environment in which the heavy road loads will be transferred in the future by ongoing EU projects to a modern and continent-wide railway network.

In the project, we use both statistical and qualitative data in the analysis and arguments, which are supported by charts, tables, and maps. Those provide a quick understanding of the degree of disparity among member states, of the policies that are being used to correct them, and of the things that Turkey has yet to do, from a logistics perspective, to be a model for the other candidates. We derived the data required for the project mainly from publications and official websites of EU agencies, in addition to books and articles in this study area.

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II. THE IMPACT OF REGIONAL DIFFERENCES ON LOGISTICS IN THE EUROPEAN UNION

A. CULTURE

1. The New European Union: A Mix of Cultures

“Culture has been described as the sum of the unique lifestyle characteristics of any human society.”⁵ Cultural differences have a big impact on logistics operations because they are barriers to effective communication and close relationships. Today’s European Union is a mix of different cultures, particularly since the integration of ten new members on May 1, 2004. Most of the new members had been part of the Soviet bloc for a long time, and thus European logisticians had to pay special attention to the various beliefs and languages of those cultures. Although those new members have made significant progress in discarding many negative aspects of their former Soviet systems, there are still some cultural differences between them and the old EU members. At the same time, for EU logisticians the admission of new members also meant an opening of new markets: “The emergence of new markets highlights the importance of executive logistics programs and their role in helping logisticians assimilate corporate and cultural differences.”⁶

Cultural barriers aren’t peculiar to relationships only between the Eastern and Western Europeans; they are also common in the relationships among the older EU members. “The German businessman,” for example, “may be very direct and precise in price negotiations, whereas the Italian may be very deliberately and expertly coy.”⁷

Some of the cultural differences between EU members add color to the lives of Europeans; other differences are barriers to the building of a central management strategy in EU institutions. The logistics managers of the enlarged European Union must have the

⁵ Franklin Root, *Entry Strategies for International Markets*, (Lexington, MA: D.C. Heath, 1987), 238.

⁶ Joseph O’Reilly, “Switzerland Banks on Logistics,” *Inbound Logistics*, March 2005 [journal online]; available from http://www.inboundlogistics.com/articles/features/0305_feature03.shtml; Internet; accessed 17 February 2006.

⁷ Donald F. Wood, Anthony Barone, Paul Murphy, and Daniel L. Wardlow, *International Logistics* (New York: Chapman & Hall, 1995), 3.

ability to understand how their operations will be accepted in the diverse nations of the EU and how they can work effectively with all the people in those countries.

Europeans are still Europeans. Italian people are different from the Dutch, who are different from the English and Germans. Companies that are successful in Europe combine Europeanization strategies with taking into account national and regional differences.⁸

2. Language Barriers

Language disparities are the most distinctive cultural barriers in the EU geography. A total of twenty official languages are spoken among the EU countries: Czech, Danish, Dutch, Estonian, English, Finnish, French, German, Greek, Hungarian, Italian, Latvian, Lithuanian, Maltese, Polish, Portuguese, Slovak, Slovenian, Spanish, and Swedish. And, on January 1, 2007, Irish will become the twenty-first language. Although English is the main business language, there are great differences among the countries in terms of the number of citizens who are able to speak English fluently. As Figure 1 shows, in the EU, besides the mother tongue, English is the most widely known language (34 percent), followed by German (12 percent), and French (11 percent). In addition, Spanish and Russian are spoken as a foreign language by 5 percent of EU members.⁹ With the integration of the new members, Russian, though not an official language, became one of the widely used foreign languages within the EU. As a result of the accession of the new languages, logistics operations in the EU require managers and employees who are capable of speaking multi-languages, which means an increase in the quality and cost of labor.

⁸ Leslie Hansen Harps, "Europe's Evolving Logistics Landscape," *Inbound Logistics*, August 2002 [journal online]; available from http://www.inboundlogistics.com/articles/features/0802_feature02.shtml; Internet; accessed 18 February 2006.

⁹ *Eurobarometer: Europeans and Languages* [publication online] (European Commission, May-June 2005); available from http://europa.eu.int/comm/public_opinion/archives/ebs/ebs_237.en.pdf; Internet; accessed 17 February 2006.

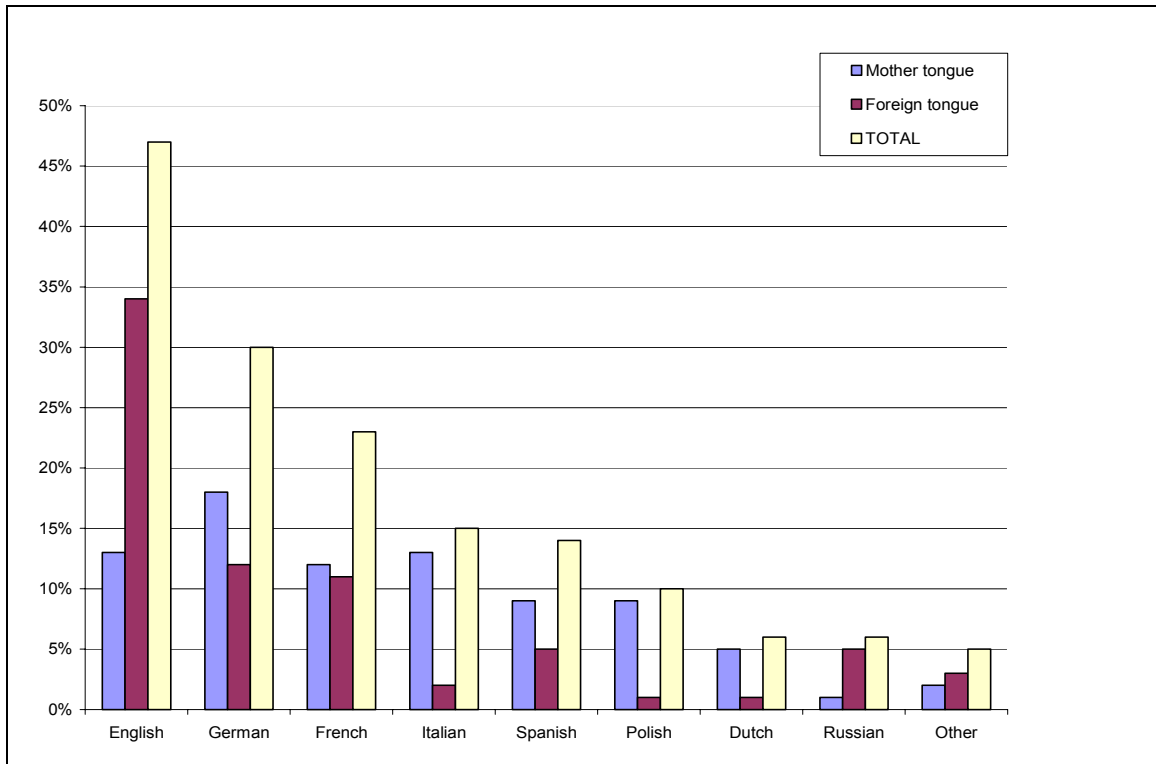


Figure 1. Languages Most Commonly Used in the EU (From: europa.eu.int, 2006)

Figure 2 shows that the overall population able to speak German and French, two major business languages, is dispersed throughout the continent.¹⁰ And in some of the new member countries, the widely known second language is Russian.

¹⁰ *Eurobarometer: Europeans and Languages.*

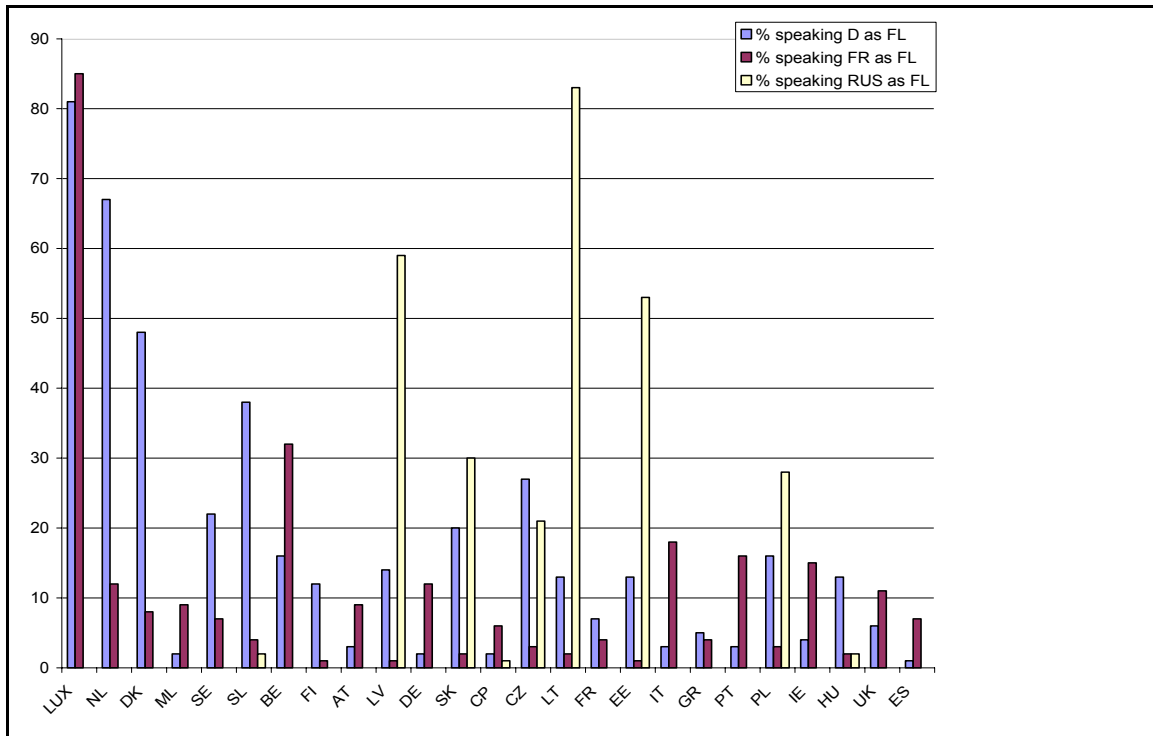


Figure 2. Percent Speaking German, French, and Russian (From: Eurobarometer, 2006)

In addition, as Figure 3 demonstrates, because the populations of the new member countries don't all have the same level of ability to speak a foreign language¹¹, documentary materials used in the logistics processes have to be prepared in more languages than before.

¹¹ *Eurobarometer: Europeans and Languages* [publication online] (European Commission, November-December 2005); available from http://europa.eu.int/comm/public_opinion/archives/ebs/ebs_243_en.pdf; Internet; accessed 18 February 2006.

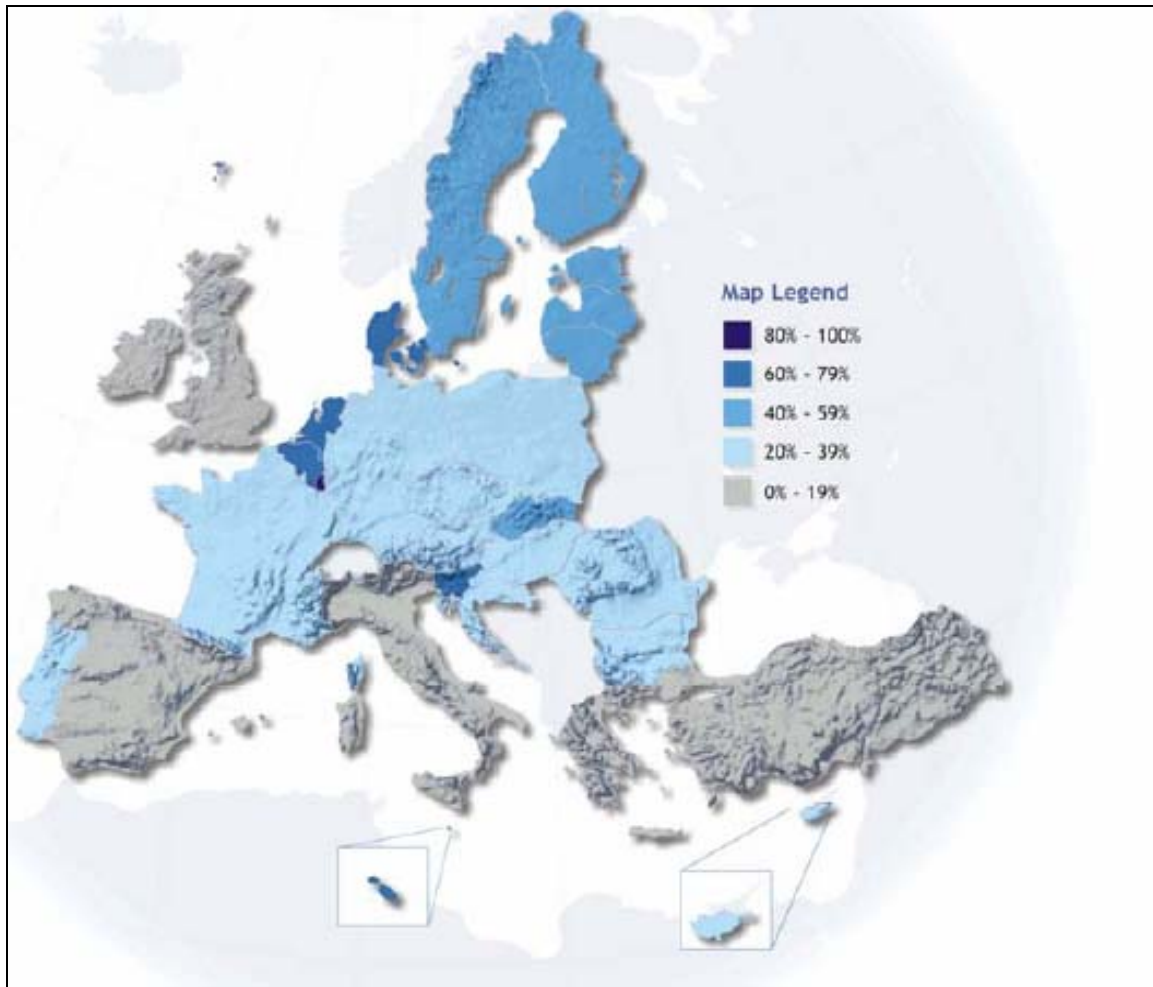


Figure 3. Conversation in a Foreign Language in the EU (Including Candidates)
(From: Eurobarometer, 2006)

The biggest language problem for EU logisticians occurs in written communications, especially when they do business with companies from new-member countries. A single translation is not sufficient to make all issues clear, and may even cause misunderstandings. Because communication doesn't mean just using language, words and sentences; communicating also involves the beliefs and understanding of the different communicators. Thus, logistics managers should use a second translation of the original language to make a comparison and reveal possible misunderstandings.

EU politicians try to induce the citizens of member countries to learn at least two additional languages. While the EU funds some of the programs designed to close the linguistic gap, member states bear most of the responsibility in the linguistic arena.

3. Educational Differences

Like language, education also has a big impact on the culture of a nation, because it brings new visions and presents people with new opportunities in their daily lives. The list below shows that most of the highly educated population in Europe is located in the western part. It further demonstrates the gap that exists between Eastern and Western Europeans in terms of education.

Europe's most highly educated cities.¹²

1. London, England, U.K.
2. Brussels, Belgium
3. Paris, France
4. Stockholm, Sweden
5. Madrid, Spain
6. Utrecht, The Netherlands
7. Glasgow, Scotland, U.K.
8. Dresden, Germany
9. Amsterdam, The Netherlands
10. Berlin, Germany (Buck Consultants International)

Each EU member is responsible for providing a means of education for its citizens; the central EU foundations contribute very little to the educational programs of the nations. However, the EU does support its members by funding programs that enable students and workers of member countries to study and work in other EU states. In doing so, it aims to fill the cultural gaps among the member states. Moreover, recently, the European Union has worked on projects such as the Bologna Process for the improvement and standardization of educational processes.

¹² Perry A. Trunick, "The Changing Face of Europe," *Logistics Today*, June 2004 [journal online]; available from <http://www.logisticstoday.com/displayStory.asp?nID=6429>; Internet; accessed 18 February 2006.

“All European countries invest a significant share of their national wealth (on average 5%) in education.”¹³ However, they don’t all allocate the same amount. The countries with the highest spending on education are Denmark, Norway, Sweden, Malta and the Netherlands.¹⁴ In general, the older EU members have the highest annual education spending rates at all levels, while new members have been unable so far to reach the same percent.

Another indicator of a country’s quality of education is the relation of its teacher salaries to its per capita GDP (Gross Domestic Product). In this area, the Eastern European countries among new EU members have the lowest proportions, though they have the same proportion of teachers in the schools as other member states.¹⁵

The technology that countries use in education also differs among EU members. This difference constitutes another regional gap between new and old members. In most of the countries, the average number of pupils aged 15 per computer in public-sector schools is now less than 10. In Slovakia, however, the average number of pupils aged 15 per computer in public-sector schools is 35.¹⁶

For logisticians who do business in EU countries, those differences are of the utmost importance because of the impact education has within the various cultures. When operating in the Western, especially the Nordic, EU countries, logisticians can feel comfortable that the knowledge and industrial discipline of the labor force is fully adequate. The ultimate result and the greatest cultural contribution of a quality education is the timeliness and skillfulness of a nation’s workforce personnel: their ability to adapt to technological implementations such as the Radio Frequency Identification (RFID) and the Internet during logistics operations and the preciseness and high quality of those operations. By only moderate spending on employee training, logistics managers can easily close the educational gap in the different EU regions.

¹³ *Key Data on Education in Europe 2005* [Web site]; available from <http://www.eurydice.org/Documents/cc/2005/en/FrameSet.htm>; Internet; accessed 18 February 2006.

¹⁴ Ibid.

¹⁵ Ibid.

¹⁶ Ibid.

4. Use of Computer in Diverse Cultures

The use of computers in daily life is an inseparable part of modern cultures. During logistics operations it indicates the degree to which people use e-commerce and the Internet. Although Eastern Europeans, the newest EU members, have the least number of PCs per inhabitants in the EU, this number varies widely among the old EU members. The average number of PCs per 100 inhabitants in the EU is 31, but it varies from 9 in Greece to 56 in Sweden among the old members.¹⁷ In terms of their use of the Internet, although half of West European households have Internet access, the variance here is large, too: 23 percent in Greece, 43 percent in France, and 68 percent in Sweden.¹⁸

As Table 1 shows, Denmark has the most enterprises with broadband Internet access, followed by Sweden and Spain.¹⁹ The EU members that have the least proportion of broadband Internet access are Greece, Slovakia, and Poland. Thus logisticians who operate in the northern and the western parts of the Europe highlight the importance of Internet use in those cultures.

¹⁷ Pascal Cagni, "Think Global, Act European," *Strategy-Business*, August 2004 [journal online]; available from <http://www.strategy-business.com/enewsarticle/enews083004?pg=all>; Internet; accessed 17 February 2006.

¹⁸ Ibid.

¹⁹ *Eurostat Yearbook 2005*. [publication online] (Eurostat News Release, 24 November 2005); available from http://epp.eurostat.cec.eu.int/pls/portal/docs/PAGE/PGP_PRD_CAT_PREREL/PGE_CAT_PREREL_YEAR_2005/PGE_CAT_PREREL_YEAR_2005_MONTH_11/1-24112005-EN-AP.PDF; Internet; accessed 16 February 2006.

COUNTRY	Small (10-49 employees)	Medium (50-249 employees)	Large (250-more employees)
EU25	48	70	87
Belgium	67	80	89
Czech Republic	33	55	73
Denmark	77	91	95
Germany	47	76	93
Estonia	65	78	93
Greece	16	42	61
Spain	69	87	94
Ireland	27	40	79
Italy	48	74	93
Cyprus	31	53	93
Latvia	42	57	70
Lithuania	49	55	60
Luxembourg	44	60	77
Netherlands	50	67	77
Austria	49	79	91
Poland	21	47	79
Portugal	43	72	90
Slovenia	56	78	91
Slovakia	22	32	58
Finland	66	87	93
Sweden	71	89	99
United Kingdom	40	62	76

EU25 excludes France, Hungary and Malta

Data not Available

Table 1. Broadband Internet Access for Enterprises, 2004 (in %) (From: Eurostat Yearbook, 2005)

5. Consumption Preferences

EU nations' consumption preferences, another major component of culture, are particularly important for European logisticians when making decisions on the location of distribution centers and warehouses. Table 2 shows the household consumption expenditures of EU nations.²⁰

²⁰ Eurostat Yearbook 2005.

COUNTRY	Housing, water, electricity, gas and other fuels	Food and non-alcoholic beverages	Clothing and footwear
EU25	21.3	12.9	6.0
Belgium	23.1	13.7	5.4
Czech Republic	22.9	17.0	5.1
Denmark	27.8	11.9	5.0
Germany	23.8	11.7	5.5
Estonia	22.2	20.6	6.1
Greece	15.6	15.3	10.1
Spain	14.4	16.0	5.9
France	24.1	14.4	4.5
Ireland	20.6	9.6	5.4
Italy	20.3	14.7	9.0
Cyprus	12.7	16.3	6.9
Latvia	21.3	24.2	8.4
Lithuania	15.2	28.0	5.9
Luxembourg	21.5	9.8	4.5
Hungary	18.6	18.2	4.2
Malta	9.0	19.0	6.1
Netherlands	21.2	11.2	5.5
Austria	19.1	10.7	6.9
Poland	24.8	19.4	4.4
Portugal	10.6	18.6	7.1
Slovenia	19.3	16.6	6.3
Slovakia	26.0	21.3	3.7
Finland	25.7	12.8	4.7
Sweden	29.4	12.6	5.2
United Kingdom	18.6	9.1	6.0

Table 2. Household Consumption Expenditure, 2003 (in %) (From: Eurostat Yearbook, 2005)

Almost 30 percent of Sweden's household expenditure is for housing, water, electricity, and gas and other fuels, followed by Denmark and Slovakia with percents of 27.8 and 26.0, respectively. The most striking fact is that the new EU members spend the highest amount of money on food and non-alcoholic beverages, while Greece and Italy are the leaders in the clothing and footwear expenditures.

B. INFRASTRUCTURE AND TRANSPORTATION

1. Road Transportation

a. *Traffic Congestion in the Alps and the Pyrenees*

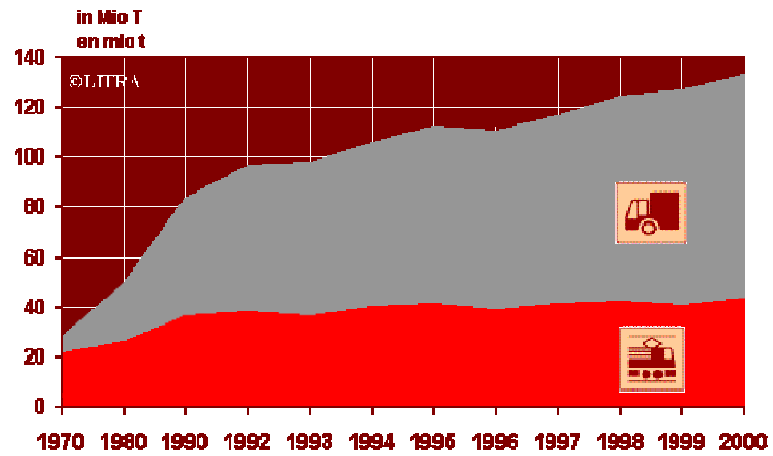
Transportation volumes have rapidly increased in Europe during the last few decades with particular growth in road transportation. In the Alps and the Pyrenees,

road transportation has increased during an even shorter period. In those areas, freight transportation flows are concentrated on a limited number of roads, mostly in narrow valleys or along coasts where the population is the densest. In the Alps huge amounts of goods, in comparison with rail transportation, are transported on roads. The consequence is that traffic is concentrated in specific areas of overcrowded and overused roads: the Fréjus and Mont Blanc tunnel in France, the Gotthard tunnel in Switzerland, and the Brenner tunnel in Austria. In the Pyrenees, the difference between road and rail transportation is even greater. Thus the growth of road transportation has had a significant impact. In the mountainous regions, road transportation flows. But only a limited amount of adequate transportation infrastructure is available for the exchange of goods between the northern and southern parts of Europe.

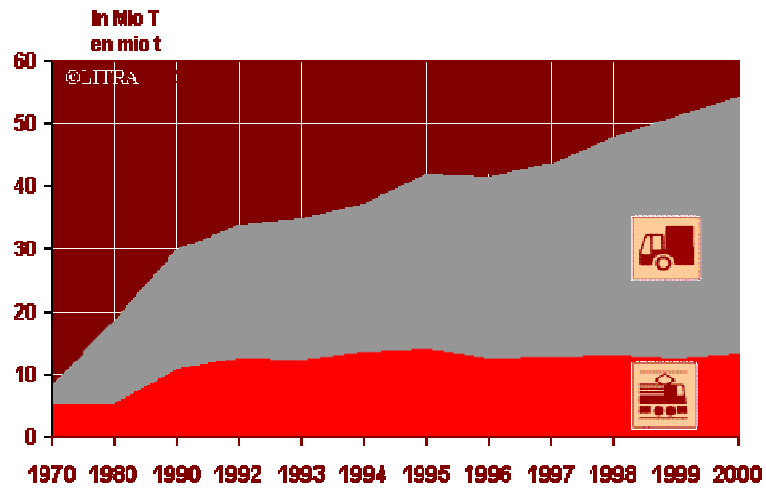
Two thirds of the goods were transported on roads and one third by rail. Rail share in Switzerland is exceptionally high with over 60%. The situation in the Pyrenees is worse than the situation in the Alps. Transport to and from the Iberian Peninsula increased significantly after Portugal and Spain joined the EU. Between 1985 and 1995, traffic volume of trucks grew by 330% in the Pyrenees. Trans-Pyrenean transport is very unevenly allocated to the different transportation modes. Over 90% of land transport is road transport (66.4 million tons in 2002). Railways play only a small role with 3.4 million tons in 2002. More than 40% of freight exchange between the Iberian Peninsula and the European Union is done by short sea shipping.²¹

There are also quite a few road links through the central Pyrenees, but they are mainly used for passenger transportation and local goods delivery. Nevertheless, during the last years the volume of heavily loaded trucks has increased significantly on the connections through the central Pyrenees although the roads were not constructed for such load pressure. There has been a major change in the methods of transportation, from rail transportation to road, which is demonstrated in Figure 4, focused on the Alps zone and

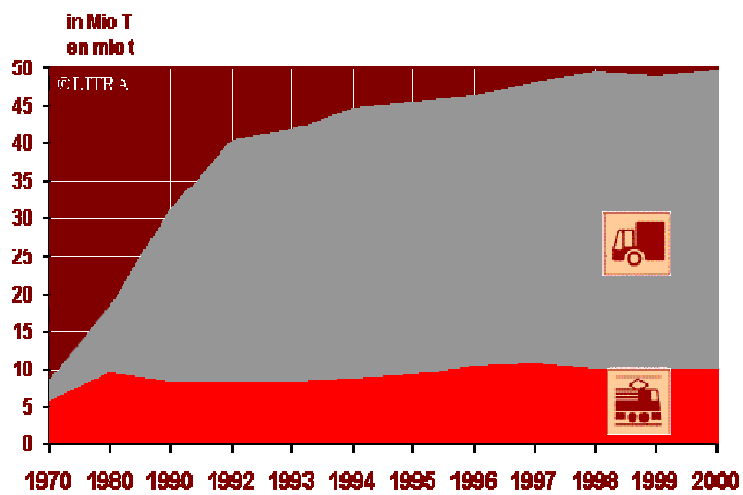
²¹ Markus Liechti, *Delivering the Goods* [publication online] (Brussels: T&E – European Federation for Transport and Environment, 2004); available from http://www.t-e.eu/docs/Publications/2004Pubs/04-8_te_report_sensitive_areas.pdf; Internet; accessed 3 March 2006.



Entire Alps Zone



Austria



France

Figure 4. Comparison of Road and Rail (in Million Tons) (From: europa.eu.int, 2006)

some EU countries during the period 1970–2000.²² In addition, transportation companies have increased delivery frequency by multiplying truck movements.

The European Union governments are beginning to deal with the overcrowding, with solutions ranging from the implementation of road tolls to additional support for rail transportation. Germany, for example, is investing heavily in railways that are constructed parallel to main highways. The ratio of rails and routes used is indicated in Table 3.²³

Millions of tons		1990	1995	1997	1998	1999	2000
Entire Alps	Rail	37.1	41.8	41.9	42.7	41.3	44.3
	Route	46	70.2	74.5	81.4	85.2	88.7
Austria	Rail	10.9	14.3	12.9	13.3	12.7	13.5
	Route	18.9	27.5	30.6	34.5	38.2	40.4
France	Rail	8.3	9.4	11	10.1	10.2	10.2
	Route	22.9	36.1	36.9	39.2	38.6	39.4
Total rail + route		83.1	112	116.4	124.1	126.5	133
Ratio rail / route		1 / 1.2	1 / 1.7	1 / 1.8	1 / 1.9	1 / 2	1 / 2

Table 3. Utilization of Roads as Compared to Rails (From: europa.eu.int, 2006)

It is possible that road transportation volumes in the European Union could significantly increase again during the coming years. If this happens, serious problems with infrastructure capacity will occur, together with traffic jams and environmental problems.

b. Integration of the New Members' Transportation Systems

Upon joining the EU, new member states became part of a single European market. This means that there will no longer be any control of goods at national frontiers, a factor that has a significant influence on truck transportation procedures. The

²² *Road Transport-Alpine Transit* [Web site] (EUROPA-European Commission-Transport); available from http://europa.eu.int/comm/transport/road/figures/transitalpin/index_en.htm; Internet; accessed 3 March 2006.

²³ *Road Transport-Alpine Transit*.

accession of the new member states and the free movement of goods largely introduced under the Europe Agreements means the internal market is being expanded. This has significant consequences for individual EU countries.

Austria, for example, has to find an appropriate response within its transportation policy to the effects of those changes. To meet present requirements and those foreseeable in the future, Austria has adopted a Transport Master Plan, which forms the basis of Austria's strategy for the long-term development of the country's infrastructure. The last decade and a half has been marked by major geopolitical changes, requiring a responsible Austrian transportation policy – then as now – to find an appropriate response to the effects of those changes. The disappearance of the Iron Curtain, Austria's accession to the European Union (EU), and subsequent EU enlargement are all specific factors in this process of change that have impacted directly on Austria. Additional factors that must be considered are the globalization of markets, the rise of business supply chains, and continuing deregulation and liberalization, especially in public transportation and the railways. The regional integration of Austria and her positioning within the transportation networks of continental Europe links Austria with new EU neighbors and the construction of logistical infrastructure and services. The top priority for road transportation will be given to the motorways and expressways of the Czech Republic, Slovakia, Hungary, and the regional ring around Vienna.²⁴

There is a plan within the EU to fund motorways and expressways by stickers and road tolls for cars on certain sections, plus an electronic system of tolls for heavy-goods vehicles using the primary road network, while responsibility for secondary federal roads has been transferred to the federal states.

²⁴ *Transport Policy in Austria* [Web site] (Federal Ministry of Transport, Innovation and Technology-EU Presidency); available from http://www.bmvit.gv.at/en/eu_rat/transport/policy.html; Internet; accessed 8 March 2006.

c. *Comparison of Road Transportation to Other Transportation Modes*

The data shown in Figures 5 and 6 illustrate the broad trends in the freight transport market in Europe over the past few decades, with rapid and continuous growth of road transport and stagnation of the other modes. Indeed, road freight has almost trebled since 1970 in Western Europe. In Central and Eastern Europe, the road mode is shortly going to become dominant. The rate of growth of freight has followed closely that of the economy, though road freight has grown faster, with elasticity above 1 (in other words, for every 10% growth in GDP, freight transport has grown by more than 10%). Indeed, between 1990 and 1995 in Western European countries road freight has grown 24% while economic growth was only 4%. The underlying reasons for these developments include the growth in trade, the creation of the single European market and shifts in social and industrial structures and habits. The dominance of road transport is explained by some of these general factors but also by its flexibility and customer-oriented qualities. Individual country forecasts confirm beliefs that these growth rates will continue and France, Germany, Italy all expect 30–50% growth between 1995 and 2010.²⁵

²⁵ Jack Short, *Road Freight Transport in Europe-Some Policy Concerns and Challenges* [publication online] (European Conference of Ministers of Transport, 6 March 1999); available from <http://www.cemt.org/online/speeches/JSver99.pdf>; Internet; accessed 5 March 2006.

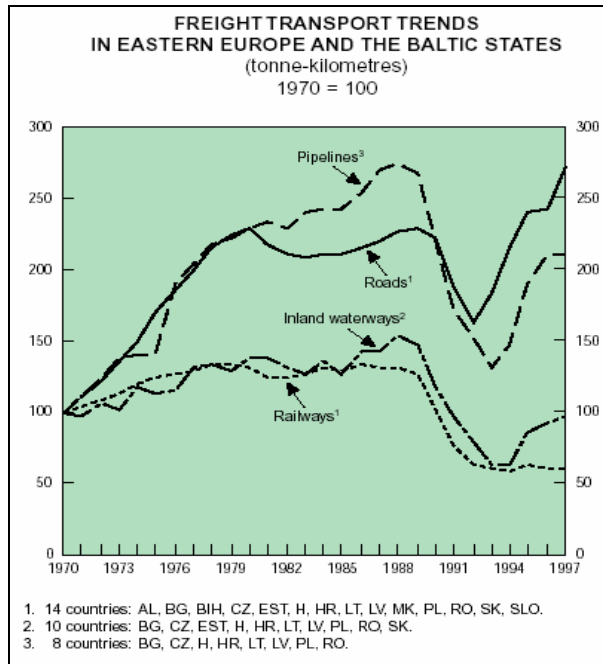


Figure 5. Freight Transport Trends (in Mentioned Countries) (From: cemt.org, 2006)

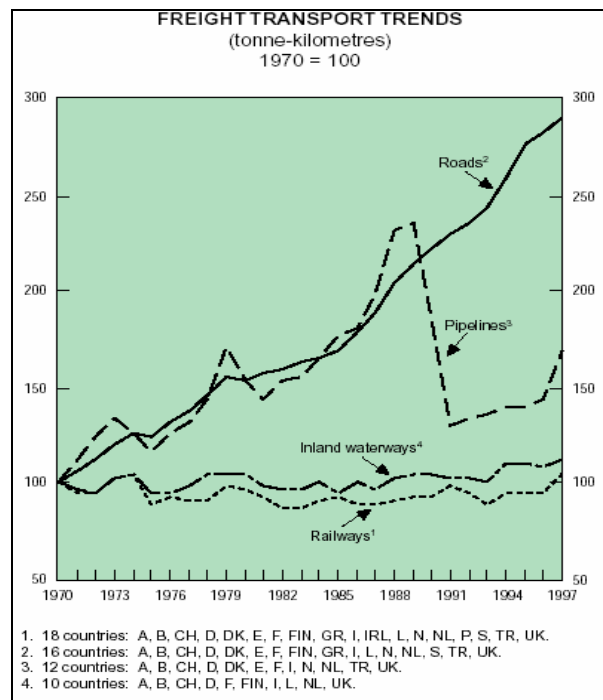


Figure 6. Freight Transport Trends (in Mentioned Countries) (From: cemt.org, 2006)

d. Average Transportation Load and Regional Aspects

Within the European Union, the average vehicle load of international transportation is higher than the national one. Only in Sweden is there a higher average load in national transportation. The reason for the higher average load in Nordic countries may be the large weight permits connected with specific commodities such as forest products. The overall total range in average loads in individual countries is relatively wide. As Figure 7 shows, Sweden, Finland, Luxemburg, and Austria have the highest average loads; Slovakia, the United Kingdom, and Latvia have the lowest average loads.

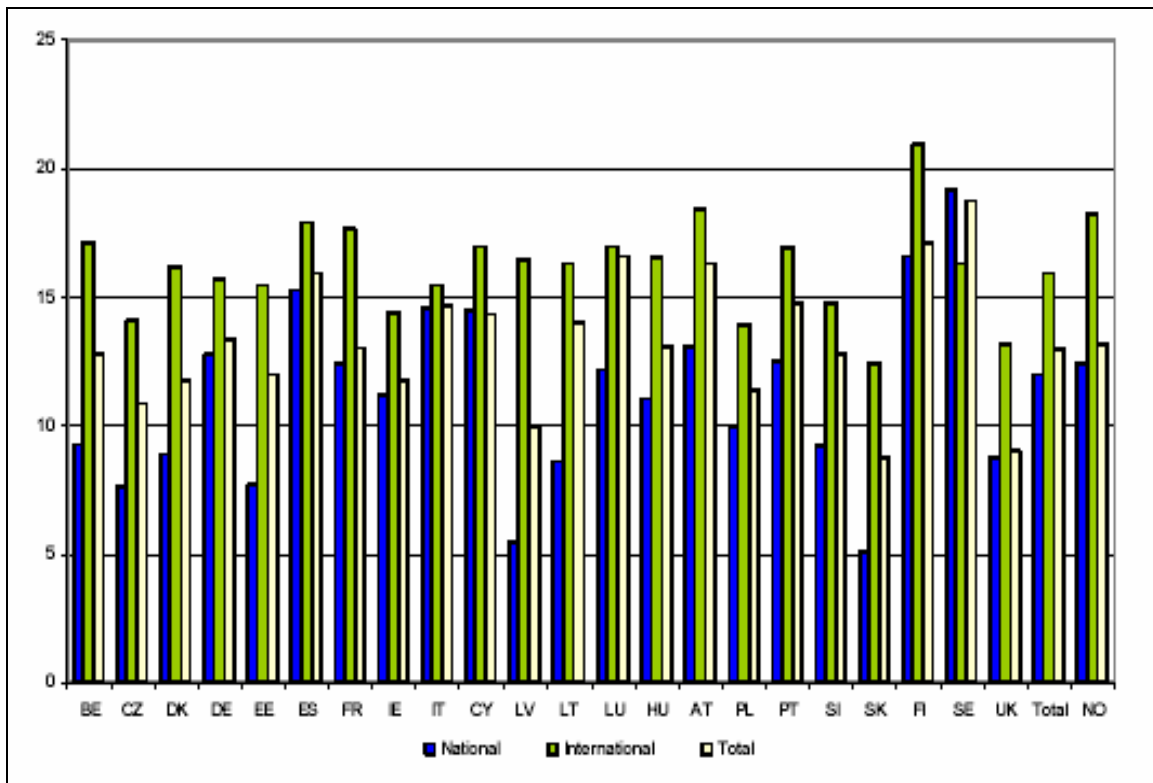


Figure 7. Average Transportation Loads (National, International, and Total) (in Tons)
(From: epp.eurostat.cec.eu.int, 2006)

Figure 8 shows how the average load by individual member states compared with the EU average in 2004. There were five countries more than 20% higher than the EU average, Sweden, Finland, Luxembourg, Austria, and Spain. Indeed, Sweden is 45% higher than the EU average, and Finland 32% higher. At the other extreme, three countries presented average loads more than 20% lower, the Slovak Republic, the UK,

and Latvia, with the Slovak Republic and the UK more than 30% below the EU average. Germany, Hungary, France, Slovenia, and Belgium were close to the EU average.²⁶

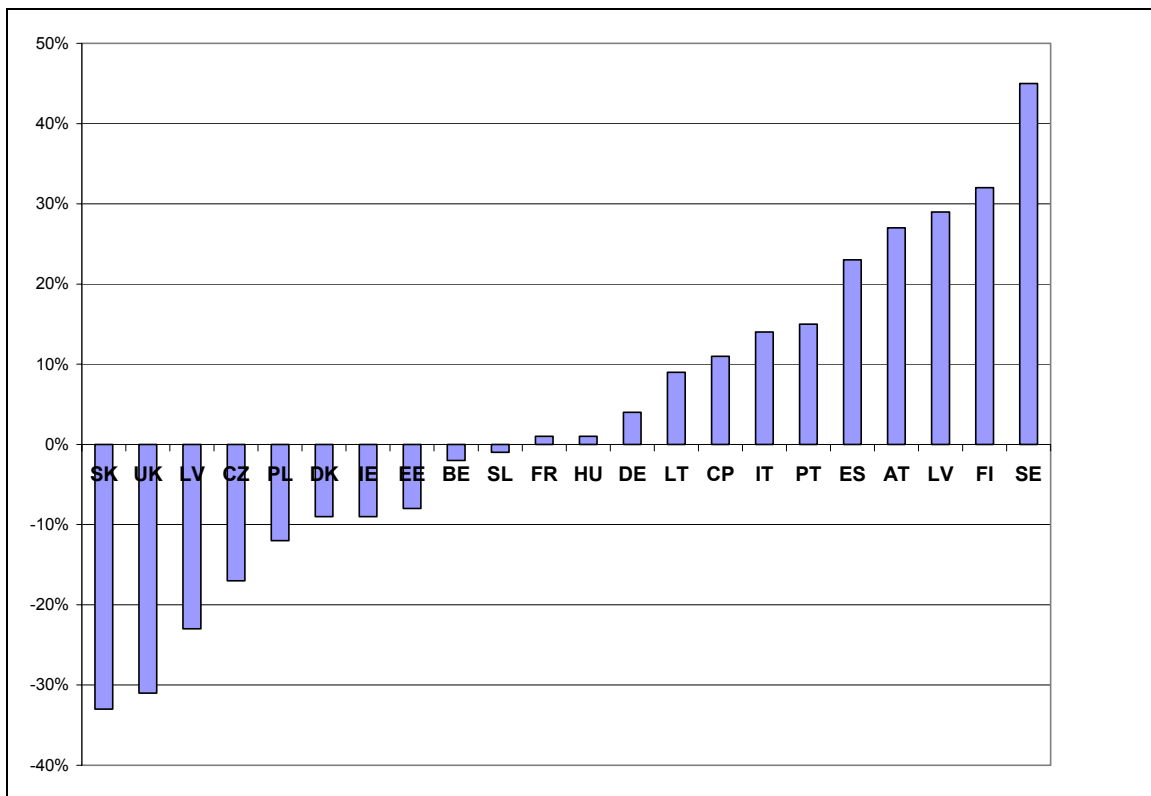


Figure 8. Average Transportation Loads Variation (From: epp.eurostat.cec.eu.int, 2006)

2. Rail Transportation

a. Variety of Railways

The enlargement of the EU increased dissimilarities among the railways of the member countries. Although trucks can easily move through the EU countries from all directions of the continent, trains don't have the same opportunity. Although the new Central and Eastern European members of the EU have wide railway networks which are above the EU average in terms of length, their old-fashioned trains, railways, and

²⁶ Carla Sciullo, Maria Smihily, *Statistics in Focus-Road Freight Transport 2000-2004: Average Vehicle Load and Regional Aspects* [publication online] (European Communities, 2006); available from http://epp.eurostat.cec.eu.int/cache/ITY_OFFPUB/KS-NZ-06-005/EN/KS-NZ-06-005-EN.PDF; Internet; accessed 4 May 2006.

operating systems are different from those of most of the old members with modern railway infrastructure and IT capabilities. Differences mainly occur in the following fields: track gauge, power supplies, rolling-stock technology, and signaling techniques.²⁷ A striking example is that a 1,700-kilometer trip from Berlin to Tallinn, the Estonian capital, by an Estonian train takes around 60 hours with a speed of 17.4 miles per hour on average²⁸, while railway transportation from Amsterdam to Paris takes only a couple of hours. The reasons behind the plight of the Eastern European railways is their former Soviet rail systems, with outmoded locomotives and cars, old-fashioned rails, old bridges, and poor IT capabilities. The gap between the old and new members can be easily seen by looking at the fact that only half of Poland's rail system is electrified while only a third is in the Czech Republic.²⁹ Dissimilarities among the rail systems of the EU countries don't occur only between the western and the eastern parts of the continent, and standardization of voltage and signaling systems especially is a common challenge across the continent. Figure 9 is a good indicator of the different electrification systems in the EU railways.³⁰

²⁷ *High-Speed Rail* [Web site]; available from http://en.wikipedia.org/wiki/High-speed_rail#Countries_currently_with_high-speed_rail; Internet; accessed 5 March 2006.

²⁸ Ralf Jackel, "EU Still Derailed over Train Harmony," *Deutsche Welle*, December 2004 [Web site]; available from <http://www.dw-world.de/dw/article/0,2144,1402239,00.html>; Internet; accessed 3 March 2006.

²⁹ Ibid.

³⁰ *White Paper "European Transport Policy for 2010: Time to Decide"* [publication online] (European Commission, September 2001); available from http://europa.eu.int/comm/energy_transport/library/lb_texte_complet_en.pdf; Internet; accessed 5 April 2006.

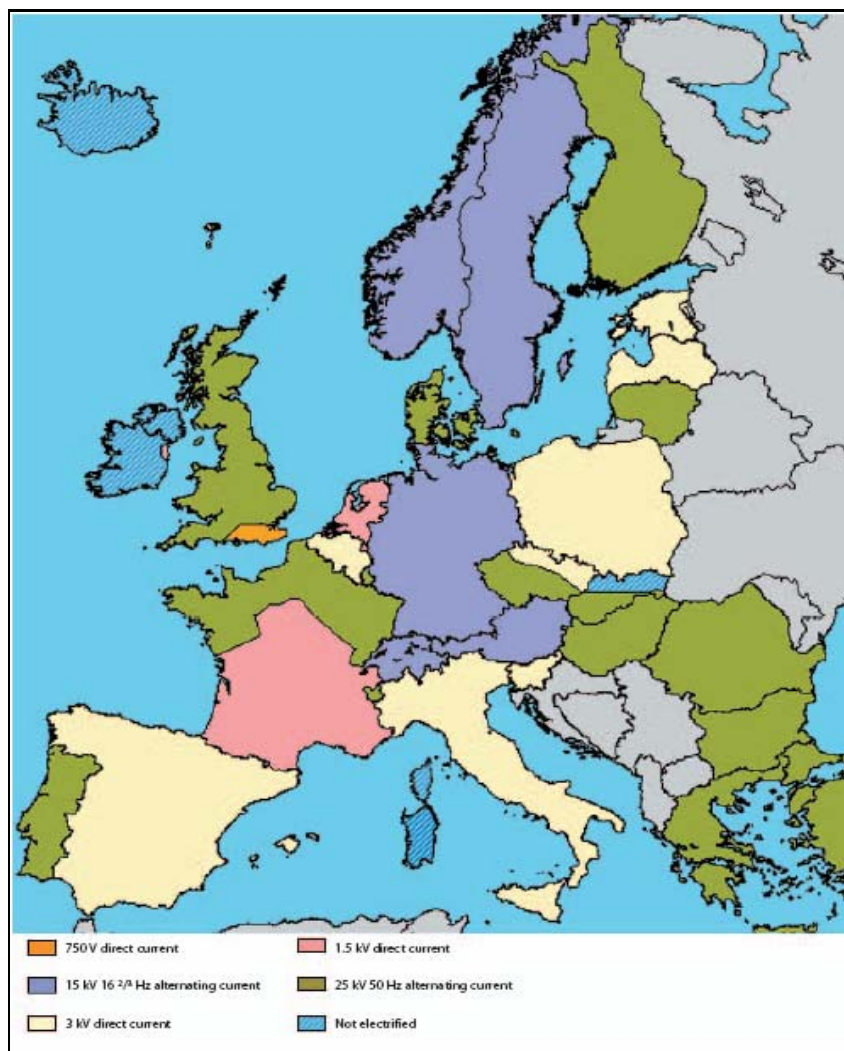


Figure 9. Main Rail Electrification Systems in Europe. (From: europa.eu.int, 2006)

The tendency among the Central and Eastern European members of the EU during the 1990s for carrying goods on the highways rather than on railways caused highways in those countries to grow by 30 percent in around fifteen years. However, in accordance with EU regulations that require members to modernize their rail systems and transfer some percent of the load of roads to railways, new members were induced to invest in their rail systems. The motivator for this policy is the fact that with the integration of European economies, trade on the continent has grown enormously, and the

need for transportation has been subjected to rapid growth as well. “The trade between the member states is expected to double in the following 15 years.”³¹

EU institutions have taken this long-lasting problem into consideration for many years, and the European Commission defined and declared ways to lighten the roads by transferring traffic to the railways. The project is aimed at modernizing the rail systems of the new Eastern European members in order to transport cargo across Europe only through the railways.³² The cost of carrying out the whole project will be around US\$306 billion, half of which will be assigned for railway infrastructure. This demonstrates the largeness of the problems with railways of the EU countries.

In terms of the length of railway lines, Germany is the leader among the EU countries, with a railway infrastructure of 35,804 km (as is shown in Figure 10³³). France and Poland follow Germany with railway lines of 31,320 km and 21,073 km, respectively.

³¹ Jacques Barrot, *Creating a European Railway Area: Inauguration of the European Railway Agency* [press release online] (European Commission, June 2005); available from; Internet; accessed 27 February 2006.

³² Ralf Jackel, “EU Still Derailed over Train Harmony,” *Deutsche Welle*, December 2004 [Web site]; available from <http://www.dw-world.de/dw/article/0,2144,1402239,00.html>; Internet; accessed 3 March 2006.

³³ *Eurostat – Total Length of Railway Lines*. [Web site] (European Commission-Eurostat); available from http://epp.eurostat.cec.eu.int/portal/page?_pageid=1073,46870091&_dad=portal&_schema=PORTAL&p_product_code=EBA11536; Internet; accessed 3 March 2006.

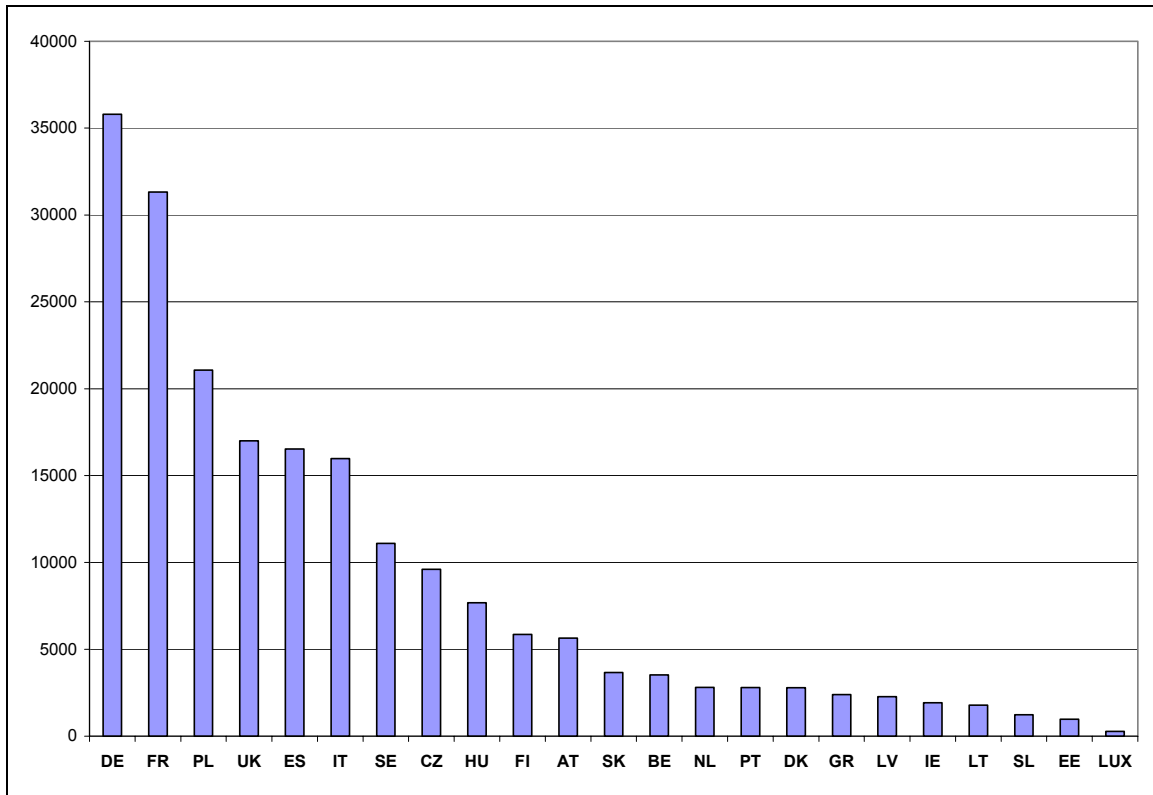


Figure 10. Total Length of Railway Lines in the EU Countries (From: epp.eurostat.cec.eu.int, 2006)

During the last decade, the total length of the infrastructures for the European Union and the EFTA countries increased for all the inland transport modes, with the exception of the railway transport that experienced a slight decrease. In terms of network density things look the same: despite an 18% decrease since 1970, Belgium still has the highest rail network density. The lowest density within the EU-15 can be found in Finland and Greece.³⁴

Most of the new members except Malta and Cyprus have a railway density that is above the EU average, due to the importance of rail transportation in those countries during the Soviet era. The percent of rail freight among all the transportation modes is again larger than the old members because of the same reasons. Despite their longer railway lines and larger use of railways for freight transportation, the proportion of electrified railways is still under the EU average. Additionally, rail freight transportation

³⁴ Eurostat – Total Length of Railway Lines.

in this part of the EU isn't conducted under the same reliable conditions as the rest of the EU. For instance, some of the railway companies don't provide their customers with insurance for the wagons, and they don't hold themselves responsible for stolen goods.³⁵ Figure 11 is a good demonstration of the rail freight network of the old members of EU.³⁶

³⁵ *The Expansion of the Logistics Sector in the CEEC*. [Web site] (Euractiv, February 2005); available from <http://www.euractiv.com/Article?tcaturi=tcm:29-135995-16&type=Analysis>; Internet; accessed 10 March 2006.

³⁶ *News 1/2001* [Web site]; available from http://www.aeif.org/public/pubs/AEIFNews1_Oct01.pdf; Internet; accessed 8 April 2006.



Figure 11. Trans-European Rail Freight Network (From: aeif.org, 2006)

The number of km of railways in operation was either slightly increased or maintained everywhere, except in Poland, where the total length decreased from 26,000 km in 1990 to 20,000 km in 2003, and in Lithuania (from 2,000 to 1,800 km). But in most of the CEEC the density of the rail network stands above the Union average (47m/Km²). This means of transport was of course greatly developed and used during the socialist régime. The Czech Republic comes first in the European hierarchy with 120 m of railways per km²; Hungary (85), Slovakia (75) and Poland (64) appear in a good position, with strong regional disparities however in Poland, inherited from the division of the country in the 19th century between Prussia, the Austro-Hungarian empire and Russia. Only 30% of the railways are electrified in the Czech Republic against 60% in Poland and an average of 45% in the CEEC, against 52% in the former EU15 (3% in Greece).³⁷

Liberalization of the railroads in the EU countries is one of the most important enablers of a necessarily modernized railway infrastructure. This renovation will bring more competition to the industry which will allow companies to invest more money in rails, cars, and IT expenditures. However, another big difference becomes apparent in the railway arena of the EU, where liberalization processes are observed even in the old EU members. “Great Britain, Sweden, the Netherlands and Germany have attempted to open up their railways to competition, while Spain, Greece and France still hold on to their nationalized systems.”³⁸

Another big problem of dissimilarities concerns the types of rail systems used in each member country. “In the EU alone, there are 15 different signal systems, three different rail gauges and five electrical currencies, which lead to massive delays at the borders.”³⁹ The number of different rail systems is 20 within the EU arena when speed control systems are taken into the consideration as well. For example, the Thalys, linking Paris and Brussels in particular, has to be equipped with seven different signaling

³⁷ *News 1/2001*.

³⁸ Ralf Jackel, “EU Still Derailed over Train Harmony,” *Deutsche Welle*, December 2004 [Web site]; available from <http://www.dw-world.de/dw/article/0,2144,1402239,00.html>; Internet; accessed 3 March 2006.

³⁹ *Ibid.*

and speed control systems.⁴⁰ The EU launched a program called ERTMS / ETCS (European Rail Traffic Management System / European Train Control System) in 2005 in order to harmonize the European rail signaling system. The total cost of the project will be more than five billion euros by 2017.⁴¹

With the proliferation of low-cost air carriers in Europe, European rail passenger traffic has decreased recently in some countries. For example, some night trains no longer run on some of the routes between Belgium, the Netherlands, and Italy. Only high-speed services have been able to keep their share in the market. However, their portion in today's EU rail sector is less than 1 percent of passenger km.⁴²

b. A Threatening Region: The Alps

The Alps are the biggest mountain range on the continent and are a kind of barrier to transportation between the eastern and the western parts of Europe. With a total length of 700 miles, they extend through France, Italy, Switzerland, Austria, Slovenia, and Croatia. "Nearly 80% of the goods traded between Italy and the other EU countries go across the Alps, two-thirds of them by road. Half of the goods carried are concentrated on the corridors of the Brenner in Austria, Fréjus and Mont Cenis in France and the Gotthard in Switzerland."⁴³ Switzerland, not a EU member, bears a big burden of the traffic among the Alpine countries; thus, 64 percent of freight moving across the Alps in

⁴⁰ Jacques Barrot, *Developing the Rail Market in Europe* [press release online] (European Commission, November 2005); available from <http://europa.eu.int/rapid/pressReleasesAction.do?reference=SPEECH/05/664&format=HTML&aged=1&language=EN&guiLanguage=en>; Internet; accessed 3 March 2006.

⁴¹ *Five Billion to Be Invested in Rail Signalling* [press release online] (EUROPA-European Commission, July 2005); available from <http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/831&format=HTML&aged=1&language=EN&guiLanguage=en>; Internet; accessed on 27 February 2006.

⁴² Jacques Barrot, *Developing the Rail Market in Europe* [press release online] (European Commission, November 2005); available from <http://europa.eu.int/rapid/pressReleasesAction.do?reference=SPEECH/05/664&format=HTML&aged=1&language=EN&guiLanguage=en>; Internet; accessed 3 March 2006.

⁴³ *Closure of the Fréjus Tunnel: Europe Must Ensure That the Alps Can Be Crossed More Safely and in a Less Polluting Way* [press release online] (EUROPA-European Commission, June 2005); available from <http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/690&format=HTML&aged=1&language=EN&guiLanguage=en>; Internet; accessed 20 February 2006.

Switzerland goes by rail, while products originating in Germany and France, by contrast, are shipped via rail 27 percent and 25 percent of the time, respectively.⁴⁴

The closure of the Fréjus tunnel, following a fatal lorry fire on 4 June, has put traffic across the Alps under the spotlight. Apart from the question of road safety, the dense and steadily growing traffic damages the environment, adversely affects the flow of trade and causes anger among the local population. The EU is taking action on various fronts to reduce congestion in the Alps: promotion of rail transport, road infrastructure charging, new rail infrastructure in the context of the trans-European networks, and dialogue with the Alpine countries, including Switzerland.⁴⁵

The limited capacity of railway infrastructure in the region creates a tendency for transporting cargo on the roads, giving rise to accidents and pollution. Moreover, the road and rail tunnels of the Alps are far behind satisfying the needs of trucks and trains going across the Alpine countries.

In 2000, a fire inside the Austrian Alpine rail tunnel near the ski resort of Kaprun killed 155 people. In 1999, a huge inferno in the Mont Blanc road tunnel between France and Italy killed 39 people. About 40 vehicles were trapped in dense smoke as temperatures reached 1000C. Two months later a blaze in the Tauern motorway tunnel under the Alps in central Austria killed 12 people and left 50 injured. Like the Mont Blanc tunnel, the Tauern lacks an escape tunnel parallel to the road system - a design flaw criticized in the initial investigation into the Mont Blanc blaze. The fires sparked a major review of tunnel safety around Europe. Inspectors visited 25 of the continent's biggest tunnels, and found that nearly a third had poor safety features. Alpine trains have also had their share of disaster. In June 2000, more than 60 people were injured when two mountain trains collided near Germany's highest peak, the Zugspitze. In 1972, 13 people died when a cable snapped on an elevated railway in the Swiss province of Vallais, sending carriages hurtling back to the valley station.⁴⁶

⁴⁴ Joseph O'Reilly, "Switzerland Banks on Logistics," *Inbound Logistics*, March 2005 [journal online]; available from http://www.inboundlogistics.com/articles/features/0305_feature03.shtml; Internet; accessed 17 February 2006.

⁴⁵ *Closure of the Fréjus Tunnel: Europe Must Ensure That the Alps Can Be Crossed More Safely and in a Less Polluting Way* [press release online] (EUROPA-European Commission, June 2005); available from <http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/690&format=HTML&aged=1&language=EN&guiLanguage=en>; Internet; accessed 20 February 2006.

⁴⁶ *Alps Tunnels' Record of Danger*. [Web site] (BBC News, October 2001); available from <http://news.bbc.co.uk/1/hi/world/europe/1617340.stm>; Internet; accessed 24 February 2006.

The accession of the former Soviet countries created a great opportunity for European logisticians to move their cargo through the Eastern and Central European members instead of Alpine countries such as Austria. The Czech Republic has become a strategic center with its roads and location in the middle of the continent. As a result, Austria has been losing its unique position as a gateway through the Alps, and the share lost by Austria has been going to new members like the Czech Republic and Hungary. The Czech government has launched several programs to improve the country's rail infrastructure in accordance with the EU policies and regulations ordering members to transfer the loads of the roads to the railways.

c. High-Speed Railway Network

"The term 'high-speed traffic' encompasses all trains running at speeds over 200 km/h but also trains running at 200 km/h if the terrain, population density or economic reasons do not justify higher speeds."⁴⁷ France is the leading country in the EU with its world-famous high-speed trains, Trains à Grande Vitesse (TGVs), and high-speed train network, which was first built between Paris and Lyon in 1981. After the construction of the first high-speed line, new lines were built in a short time between other cities of France and then those lines were extended to some of the other EU countries such as the UK, the Netherlands, and Belgium. France has been working on the implementation of the Automotrice à Grande Vitesse (AGV) with a maximum speed of 350 kilometers per hour which is the new generation of TGV.⁴⁸

Although Germany started a high-speed rail program after France and first began using high-speed trains in its territory almost ten years later, today it has Inter-City Express (ICE) high-speed trains that have a maximum speed of 363 kilometers per hour.⁴⁹ Germany's high-speed rail network covers a huge area both within the country and in the region between other countries like Austria, the Netherlands, Belgium, and

⁴⁷ *High Speed for Europe*. [Web site]; available from <http://www.jrtr.net/jrtr03/f17ell.html>; Internet; accessed 13 February 2006.

⁴⁸ *High-Speed Rail* [Web site]; available from http://en.wikipedia.org/wiki/High-speed_rail#Countries_currently_with_high-speed_rail; Internet; accessed 5 March 2006.

⁴⁹ Ibid.

Switzerland. Germany has been building a new generation of high-speed trains called Transrapid. Transrapid will have a magnetic levitation system that will allow it to be the fastest rail transportation system on the continent.

The United Kingdom hasn't been able to catch up with France and Germany in terms of the number of trains and their speed capacities. The UK's high-speed train, Eurostar, uses the Channel Tunnel and operates between the UK and France and Belgium. Regional differences are more apparent for the UK in terms of the interoperability of its high-speed trains because of the voltage and signaling differences between the countries.⁵⁰ Those differences caused the UK to modify and use France's TGV trains, which became capable of adjusting to different voltages and signaling systems after those modifications. The rest of the trains used in the UK have slower speeds, mainly due to local limitations for the trains operating between the cities inside the country.

"Italy is the first user of high-speed trains in Europe since the Rome-Florence 'Direttissima' was the first high-speed line in Europe and one of the first anywhere in the world."⁵¹ Today Italy is building several high-speed railways which will enable trains to run between more Italian cities. Besides, there will be new high-speed routes between Italy and other European countries.

The Netherlands and Belgium have high-speed rail connections both between themselves and between Germany and France. Some of the trains running on those routes are TGV-derived Thalys while some are German ICEs.⁵² Both of those countries have been constructing new high-speed networks, some of which are operational and some of which are still under construction.

Portugal has been using high-speed trains between two major cities and plans to construct a new link between Lisbon and Madrid under a project by a new public

⁵⁰ *High-Speed Rail*.

⁵¹ *High Speed System – Rome-Florence "Direttissima"*. [Website] available from http://www.italferr.it/english/projectsitaly/rm_firenze.asp; accessed 5 March 2006.

⁵² *High-Speed Rail* [Web site]; available from http://en.wikipedia.org/wiki/High-speed_rail#Countries_currently_with_high-speed_rail; Internet; accessed 5 March 2006.

company with a cost of 5 billion euros.⁵³ Another EU country using high-speed trains is Spain with a line between Madrid and Sevilla. Spain is planning to have 7,000 km of high-speed trains by 2010, which will link all provincial cities to Madrid within four hours and Barcelona within six hours.⁵⁴ Moreover, Finland, Sweden, Poland, Slovenia, and the Czech Republic are five other EU members that have minor high-speed rail systems.

All things considered, a high-speed rail network causes one of the greatest regional transportation disparities within the EU's borders. New EU members need to construct or expand high-speed rail infrastructure in their countries, in particular, while some of the old members like Greece also need to do the same in the near future in order to expedite the rail passenger transportation between their cities and other European countries. Other than monetary issues, their small population density prevents some members from constructing high-speed rail infrastructure within their territories.

Although the number of EU countries that have high-speed rail systems is limited, high-speed trains operating beyond the borders of their nations require specific equipment and modifications in order to adapt to the voltage and signaling systems of the other countries.

Figure 12 shows the EU countries with high-speed rail systems and the development of those systems between 1981 and 2001.⁵⁵ Although the figure lacks several countries that acquired high-speed systems after 2001, it gives a general idea about the use of those trains within the Union. France's leadership in terms of the number and the speed of trains is apparent in the figure.

⁵³ *The Future* [Web site]; available from <http://www.railway-technology.com/projects/alfa/>; Internet; accessed 3 March 2006.

⁵⁴ *High-Speed Rail* [Web site]; available from http://en.wikipedia.org/wiki/High-speed_rail#Countries_currently_with_high-speed_rail; Internet; accessed 5 March 2006.

⁵⁵ *High Speed Trains in Europe* [Web site]; available from http://www.cer.be/files/Br_01_10_2002_ENb-112515A.pdf; Internet; accessed 1 April 2006.



Figure 12. High-Speed Rail Lines in Europe in 2001 (From: cer.be, 2006)

3. Inland Water Transportation

Another way besides railways to shift freight from roads is to use waterways, especially inland waterways. Recently, the EU proposed such a program, which could not only provide better connections for peripheral countries, but also, most important, it could be a viable and less costly alternative to new infrastructure on saturated overland corridors. For example, maritime connections between Spain, France, and Italy would reduce traffic traveling through the Alps and the Pyrenees. As was mentioned before, with support from the coastal shipping industry, there is a high level of expectation attached to the ability of the national rail systems to shift freight movement away from trucks. Inland waterway transport is a significant option for improving Europe's transport system, which is suffering from congestion and delays and harms the environment. Shifting more of the load to water will help countries deal with the constantly growing transportation flows. Moreover, inland waterway transportation has a great potential for being fully integrated into the entire supply chain of the European Union.

Waterway transport has inherent advantages including that it is safe and clean and it can also be cheap and reliable. Unfortunately the words safe and clean are not recognized fully by markets. And transport markets, driven by trade and economic growth have not turned to inland waterways. Over the last thirty years, transport has grown at about 2% per annum but within the modes, road transport has grown by 4% per annum and

waterways and rail traffic have remained more or less the same in volume terms. At present waterways have 6-8% of traffic in ECMT, though the figures are much higher on individual corridors. New industrial location patterns and changes in the structure of goods explain a large part of the declining market share for both railways and waterways (estimates from Germany are that 60% of the traffic share loss is due to economic restructuring with the other 40% due to lack of competitiveness in traditional markets).⁵⁶

The waterway network in the European Union region is not very dense and water flows no longer correspond necessarily to the transportation flows. Moreover, like road transport, it is a sector with many small operators. In itself, this is not a problem, but it leads to weaknesses in creating logistical chains and networks. Another difficulty is that its competitors are more likely to be rail than road. These considerations raise the fundamental question of whether the sector is in an inevitable decline or is a sector that, because of its inherent advantages, can start to play a greater role in international traffic. Certainly there are some positive signs, with growing traffic, especially of containers, and, despite the closure of the Danube, record traffic on the main canal. Increasingly, we are seeing that traditional markets can be supplemented by the traffic of consumer goods and agricultural products. Figure 13 shows all the main European waterway systems: the Rhine, the Danube, and Polish, Russian, and Ukrainian waterways.⁵⁷

⁵⁶ Jack Short, *Accelerate towards a Free and Strong Inland Waterway Transport* [publication online] (European Conference of Ministers of Transport, September 2001); available from <http://www.cemt.org/online/speeches/JSrott01.pdf>; Internet; accessed 23 March 2006.

⁵⁷ *Waterways System in Europe* [Web site]; available from http://www.inlandnavigation.org/p07_02.html; Internet; accessed 23 March 2006.

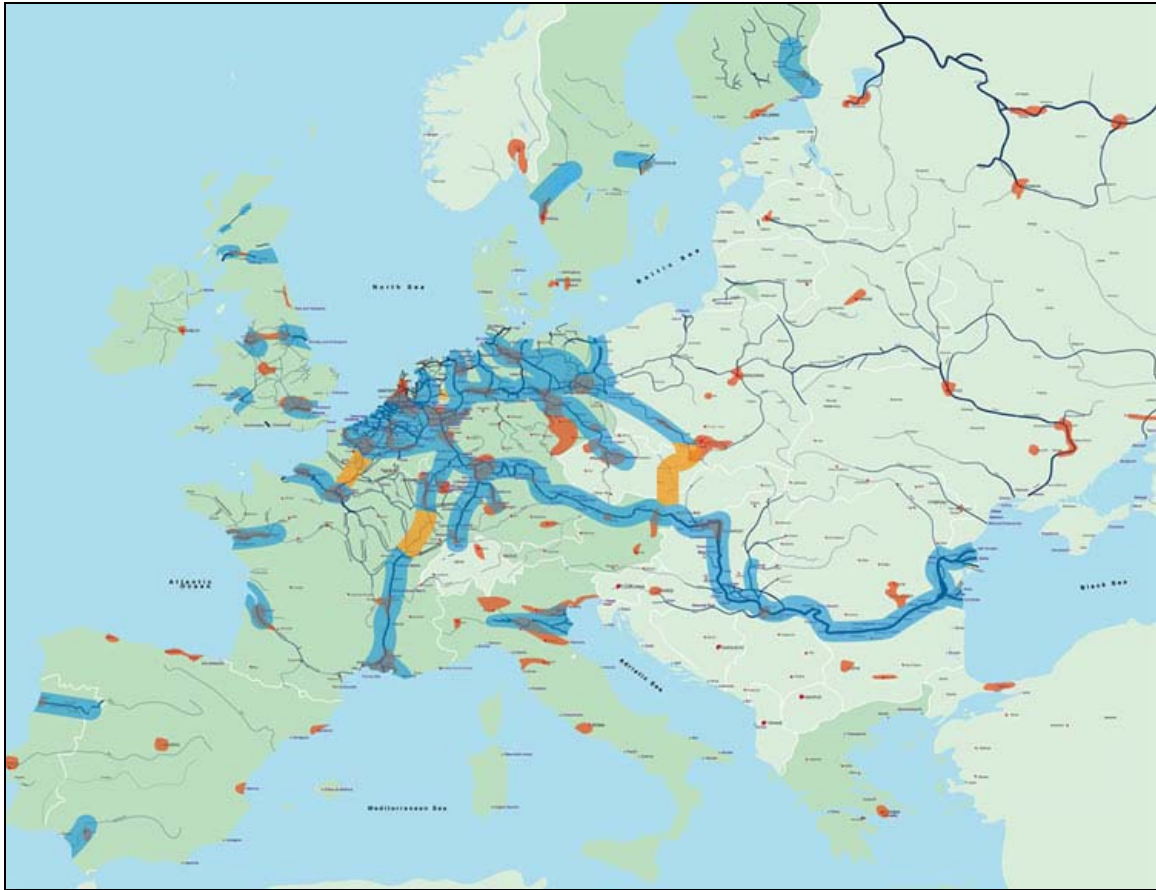


Figure 13. The Waterways System in Europe (From: inlandnavigation.org, 2006)

Figure 14 below demonstrates the development of inland waterways in Europe. The major development in freight transport though was the sharp rise in road transport; the level in 1998 is three times the level in 1970. This has resulted in this period road has increased its share from 48% (1970) to 74% (1998) for the EU-15, whilst other modes have all seen a decline. Inland waterways 12% (1970) to 7% (1998); railways 33% (1970) to 14% (1998); and pipelines 8% (1970) to 5% (1998).⁵⁸

⁵⁸ Martin KRAAN, *The Inland Waterways of Tomorrow on the European Continent* [publication online] (European Conference of Ministers of Transport, January 2002); available from <http://www.cemt.org/online/Paris02/KraanE.pdf>; Internet; accessed 16 March 2006.

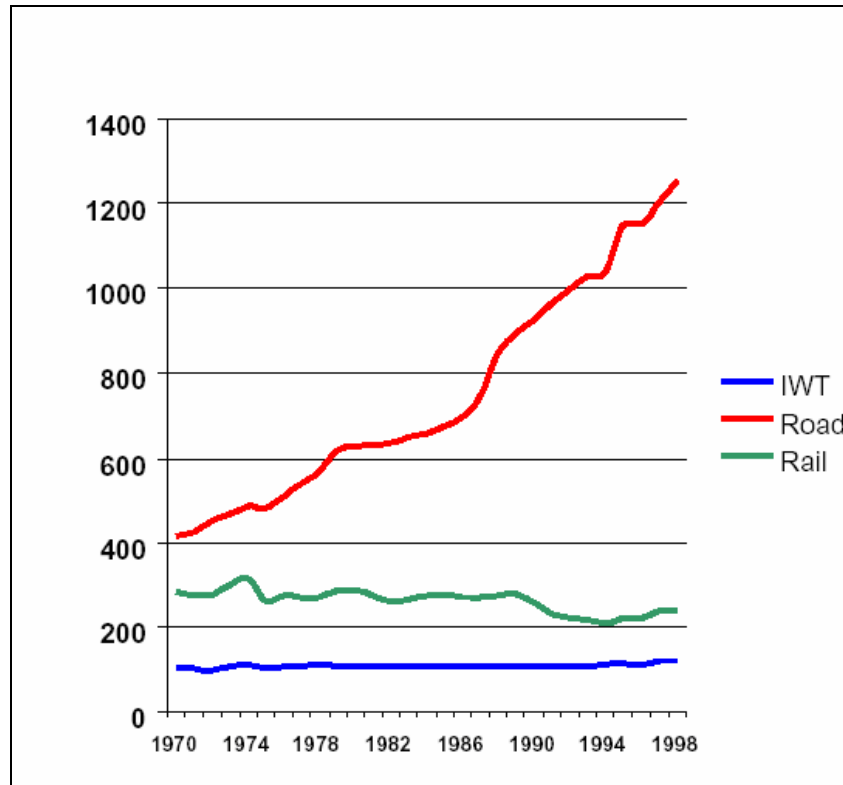


Figure 14. Transport on the EU-15 (1,000 Million Tonkilometres) (From: cemt.org, 2006)

Inland water transportation occurs mainly on the Rhine, the Schelde, the Meuse, the Main, the Danube, and many less important waterways. Inland waterway transportation plays a significant role in the imports and exports passing through Northwestern Europe and in many cases creates the links for the EU's largest seaports. Inland waterway transport is environmentally friendly, low-cost, and safe as compared to the land transportation alternatives, particularly the overcrowded road transportation. In the northwestern part of the European Union, for heavy shipments traveling long distances, in many cases, inland waterway transport is both the cheapest and the most environmentally friendly method of transport. On the other hand, a disadvantage of this mode of transportation is that deliveries usually take relatively long transport times. Due to various economic and logistics trends, the market share of barge transport in traditional markets such as ore, coals, petro-chemicals, and animal fodder is also under pressure by road and rail transport.

One of the specific characteristics of the inland waterway transport market is that the barges have a long lifespan. It is not unusual for barges to be used for fifty years or longer. The main transportation areas of concern are described below. From the point of view of trans-European networks, four transportation corridors making use of inland waterway transportation are:

1. The Rhine corridor. Of all the European countries, the Netherlands has the densest inland waterway network.
2. The North–South corridor, comprising rivers and canals in the Netherlands, Belgium, and France. The river Scheldt is used intensely for north–south transportation between the Netherlands and Belgium, especially between the big seaports of Rotterdam and Antwerp.
3. The East corridor, covering the inland waterway transportation from Germany to Poland and the Czech Republic. Since the early 1990s, trade and transportation between Poland and Western Europe have increased sharply. Most of the growth has been accommodated by road and rail freight transportation. In the Czech Republic, some 300 km of waterways are operational for the transportation of goods. These are the regulated river Labe and canals of the Labe and the Vltava. The average depth of these rivers is from 1.8 to 2.0 m. There are also plans to make the river Morava navigable and connect it to the river Danube after the year of 2010.
4. The South-East corridor, including the Danube, the Main, and two canals, the Main–Danube Canal and the Danube–Black Sea Canal. Water transportation is an important mode of a transportation system in the whole area of Central and Eastern Europe.

It is very important for transportation within the European Union to introduce direct connections between the different river ports over sea routes. This process needs very close cooperation among not only EU countries but also with eastern countries like Russia and Ukraine. The use of short sea shipping routes for establishing direct links between river ports is in reality almost always possible, but it leads to difficulties of a technological nature; it is also important to pay attention to their economic viability. This solution demonstrates that a waterway system is appropriate under certain conditions, but it can accommodate only small-size ships as compared to the sea ships that have surely restricted the profitability and therefore the expansion of shipping services.

Despite the drawbacks, inland waterways have great potential and should be treated equally. It is estimated that a comparison of the number of people and the costs involved shows why dealing with inland waterways is not a political or economic interest of the European Union.

4. Warehousing

a. *EU Expansion toward Central and Eastern Europe*

Right after the breakdown of the Soviet Union, foreign investors began expanding into the Central and Eastern European countries, which opened their eyes to that open-market economy. Even before their accession to the EU, the new member countries had attracted foreign investors increasingly during the last decade. Since their accession in 2004, as Table 4 and Figure 15 show, the foreign direct investment growth rate has gone up enormously in this region.⁵⁹

(Bil. US\$)	Average, 1993-1998	1999	2000	2001	2002	2003	2004	2005	2004 growth rate (%)	2005 growth rate (%)
New EU Members	10.1	18.1	21.8	19.4	23.3	12.5	27.8	37.7	122.4	35.6
Poland	3.9	7.3	9.3	5.7	4.1	4.1	6.2	5.3	51.2	-14.5
Czech Republic	1.6	6.3	5	5.6	8.5	2.5	4.5	12.5	80	177.8
Hungary	2.4	2	2.8	3.9	3.1	2.3	4.2	6	82.6	42.9
Slovak Republic	0.3	0.3	2	1.5	4.1	0.6	1.3	2.5	116.7	92.3

Table 4. Foreign Direct Investment Growth Rate (From: standardandpoors.com, 2006)

⁵⁹ *Foreign Direct Investment Growth Rate to Emerging Market Economies Slows in 2005, but There Is Still Plenty to Go Around* [Web site]; available from http://www2.standardandpoors.com/servlet/Satellite?pagename=sp/sp_article/ArticleTemplate&c=sp_article&cid=1140586482336&s=&ig=&b=2&dct=4; Internet; accessed 5 March 2006.

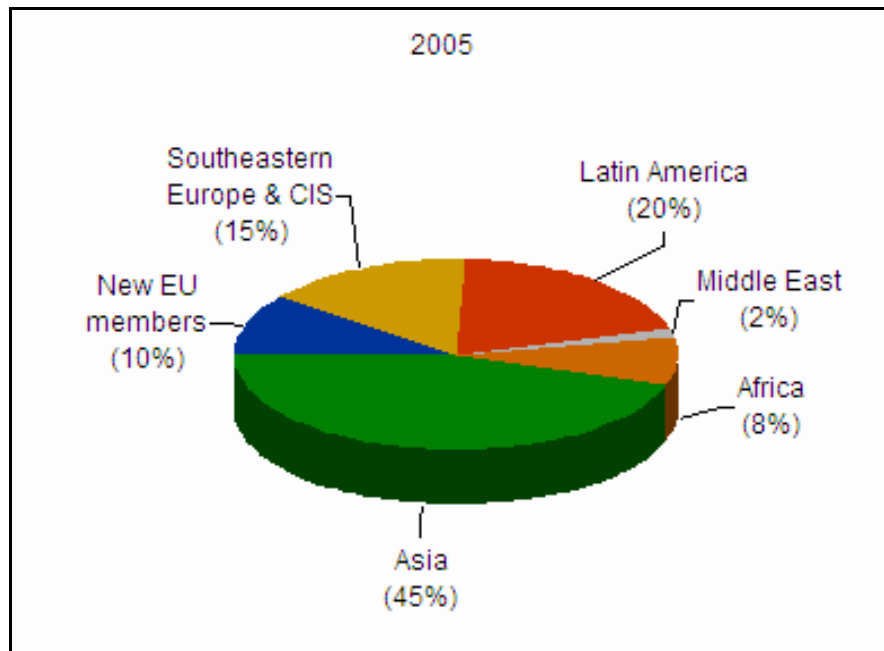


Figure 15. Foreign Direct Investment in 2005 (From: standardandpoors.com, 2006)

Due to their low labor and land costs and a great location between Western and Eastern Europe, Poland, the Czech Republic, Slovakia, and Hungary in particular attract foreign direct investment. With the increase in the intensity of industrial investment in the region, the intensity of logistics operations has been increasing in the same proportion as well. Big European companies started to give directions to their logistics managers to look for appropriate warehouses in those countries at the beginning of the 1990s when it became clear that those four countries with very close connections to Western Europe would become a part of the EU in the near future.⁶⁰

The number and qualifications of warehouses in EU countries vary in accordance with certain determinants, such as their geographical location, remoteness to markets, the cost and capacity of labor, and their industrial infrastructure. The Soviet-era warehouses with little space and out-of-date technology in most of the new member countries mark them as different than the old members having modern warehousing facilities of huge capacities. However, the number of new warehouses in this region that

⁶⁰ *European Warehouse Market Research – August 2004* [Web site]; available from http://ir.prologis.com/downloads/EUExpansion_0804.pdf; Internet; accessed 5 March 2006.

have a capacity and technological adequacy similar to that of the old members has been growing in an extreme manner, especially near or within capital cities like Warsaw, Budapest, and Prague.

In response to the ongoing strong demand, modern large warehouses are being built in many Central European cities. Construction standards are essentially the same there as in Western Europe. Occupiers require that the buildings be designed to accommodate the same equipment that they use elsewhere in Europe.⁶¹

“The facilities we are building in Poland now are as good as any in the world, with high ceilings and easy access at loading docks,” says Robin P.R. von Weiler, managing director of ProLogis, a real estate investment trust (REIT) based in Aurora, Colo., which recently completed a 451,920 sq. ft. distribution center in Poland for use by Unilever PLC.⁶²

New warehouses have been built to meet the needs of the industrial growth in each single country in conformity with the goods they manufacture.

Certain regions within Central Europe are evolving into hubs for particular industries. Automotive production, for example, is clustering in the Czech Republic, Poland, and Slovakia. Poland has the largest food and beverages industry in Central Europe. Pharmaceutical production is concentrated in Hungary and Slovakia. Hungary is also fast becoming a location for shared service centers for companies such as GE, Diageo, and GM. With its Alpine scenery and Mediterranean ambiance, Slovenia is developing a thriving tourism industry.⁶³

Other new members haven't been able to keep up with Poland, the Czech Republic, Slovakia, and Hungary because of their remoteness from Western Europe and the lack of modern transportation infrastructure to move goods fast between warehouses and customers. On the other hand, those four countries have spread new modern warehouses over not only capitals, but also other large cities in order to satisfy market needs within their countries.

⁶¹ *European Warehouse Market Research – August 2004.*

⁶² Stan Luxenberg, *Warehouses for Warsaw* [Web site] available from <http://www.highbeam.com/library/doc3.asp?DOCID=1G1:122762452&num=3&ctrlInfo=Round19%3APr od%3ASR%3AResult&ao=&FreePremium=BOTH>; Internet; accessed 1 April 2006.

⁶³ *Ibid.*

Construction of new, modern warehouse space initially was concentrated near or within the region's largest cities: Warsaw, Prague, and Budapest. Developers now appear to be searching for suitable sites in other large cities besides the national capitals. During the past two years in Poland, for example, modern warehousing has expanded beyond the Warsaw region and moved to the west and south where population densities are equal to or larger than the capital. Similarly, Bratislava is now the focus of many Third Party Logisticians (3PLs) due to its proximity to Austria and excellent road connections to the Czech Republic and Hungary.⁶⁴

Warehouses in the new member countries are usually used to stock goods that will be sold domestically or in other European countries. The flow of merchandise from west to east is very seldom within EU territory due to the high prices of Western European merchandise for citizens of the Eastern European countries. Nonetheless, both parts of the EU benefit from the logistics operations enabled by the trade between them. From a logistics perspective, the only country that has been unfavorably affected by the accession of the new members is Austria. During the time of the Soviet Union, the only passage between Western and Eastern Europe was through Austria. Today, however, logisticians are willing to construct new warehouses in new EU countries located in the same region, instead of Austria, because of lower operating costs. "Good motorway access from Bratislava in Slovakia and Brno in the southern Czech Republic favor these alternative locations for serving businesses in and near Vienna in addition to other markets in Central Europe."⁶⁵

b. Effects of Land and Labor Costs on Warehousing within the Entire EU

Land and labor costs are two significant determinants of the degree of technology used in warehouses. The Scandinavian members of the EU distinguish themselves from their southern counterparts by the high-tech, automated, and compact warehouses they own which need fewer employees to operate as compared to other

⁶⁴ Luxenberg.

⁶⁵ *European Warehouse Market Research – August 2004* [Web site]; available from http://ir.prologis.com/downloads/EUExpansion_0804.pdf; Internet; accessed 5 March 2006.

members such as France which has cheaper land and labor. Figure 16 is helpful for understanding the gap between the northern members and others in terms of land prices.⁶⁶



Figure 16. Land Prices in Major European Logistics Hubs (From: European Warehouse Market Research, 2006)

According to the figure above, land prices vary between €/76 a square meter and €/93 a square meter around Stockholm and Norrköping in Sweden, while they change from €/48 a square meter to €/65 a square meter around Paris. In the new member countries, the land cost is much less than it is in the old northern members. The striking difference is easily recognizable between the Vienna–Budapest region with €/38–81 a square meter and London with €/83–141 a square meter.

⁶⁶ European Warehouse Market Research – August 2004.

Rents for distribution space have climbed slowly or fallen a bit in most countries. From 2001 to 2003, rents rose at an annual rate of 1.4% in the U.K. Conversely, rents dropped at an annual rate of 1.4% in France during the same period due to a lackluster economy. France's GDP grew at an annualized rate of only 1% in 2003. According to Cushman & Wakefield, the U.K. boasts some of the most expensive rents in Europe. Rents in London were 132 euros per sq. meter per year in 2003 compared with 53 in Paris.⁶⁷

Labor cost is another factor that determines the type of warehouses in a specific region. Figure 17 illustrates the labor-cost rationale, for example, for building highly automated warehouses in the northern EU countries. “The labor cost advantage will gradually disappear as living standards improve in the East, but it should remain an advantage for about the next 10 years.”⁶⁸

⁶⁷ Stan Luxenberg, *Warehouses for Warsaw* [Web site] available from <http://www.highbeam.com/library/doc3.asp?DOCID=1G1:122762452&num=3&ctrlInfo=Round19%3AProd%3ASR%3AResult&ao=&FreePremium=BOTH>; Internet; accessed 1 April 2006.

⁶⁸ Perry A. Trunick, “Logistics in Eastern Europe Moves at a Snail’s Pace,” *Logistics Today*, March 2005 [journal online]; available from http://www.highbeam.com/library/doc3.asp?fr=1&full=yes&docid=1G1:130970086&refid=ls_pub&skeyword=&teaser=&origurl=http://www.highbeam.com/library/doc3.asp?docid=1G1:130970086&refid=ls_pub&skeyword=&teaser=; Internet; accessed 2 April 2006.

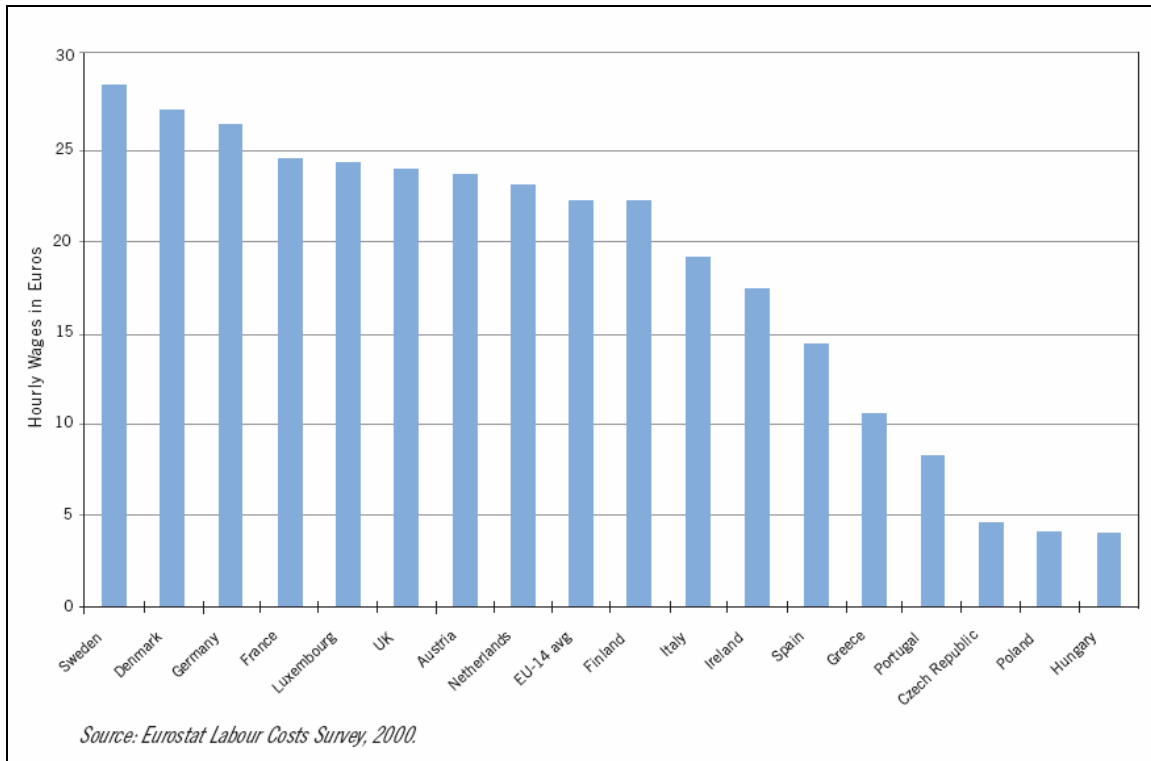


Figure 17. Hourly Labor Costs Across Europe (From: highbeam.com, 2006)

For manufacturers, the appeal is an abundance of cheap labor. While hourly labor costs are above 25 euros in Sweden, they are about five euros in Poland. Carmakers have been eager to shift production to Eastern Europe, and parts suppliers have followed. Retailers have joined the parade.⁶⁹

In addition to the costs, regulations in each country may cause logistics operators to design different types of warehouses. For example, in France, warehouses for chemicals can be operated only with a specific type of license which is required for storing metals or paper as well.⁷⁰ In some other EU countries, keeping warehouses and distribution centers open twenty-four hours a day is forbidden, a kind of regulation that causes logisticians to locate their centers outside residential areas.

⁶⁹ Stan Luxenberg, *Warehouses for Warsaw* [Web site] available from <http://www.highbeam.com/library/doc3.asp?DOCID=1G1:122762452&num=3&ctrlInfo=Round19%3APr od%3ASR%3AResult&ao=&FreePremium=BOTH>; Internet; accessed 1 April 2006.

⁷⁰ Michael Stolarczyk, *The European Union – A Distribution Primer* [Web site]; available from <http://blogonlog.blogspot.com/2005/11/european-union-distribution-primer.html>; Internet; accessed 29 March 2006.

c. A Dominant Country for Distribution Centers: The Netherlands

The Netherlands distinguishes itself from other EU members by its highly developed logistic infrastructure and highly skilled labor force, which make it one of the most important logistics hubs in the world. As a global logistics hub, this geographically small country owns most of the distribution centers of the EU. Facilities like the Rotterdam port, the busiest seaport of Europe, and Schiphol Airport, the third busiest cargo airport on the continent, have created a great distribution sector in the Netherlands. As a result, warehouses with very high inventory capacities and IT capabilities have been built all over the country.

Within Europe, The Netherlands has a dominant market share of EDCs (European Distribution Centers). In 1997, nearly 550 EDCs were located in The Netherlands. This is more than half of all EDCs in Europe (BCI, 1997). Research indicates that the number of EDCs rose to approximately 650 in 2001 (NDL/BCI, 2001). In other words, The Netherlands is an attractive location for EDCs. Research of BCI (1997) and De Ligt (1998) shows that the main location factors that attract EDCs to the Netherlands are: its central geographical position within Europe, the availability of logistics know-how, know-how of customs and tax-regulations, the transportation infrastructure, the two main ports, namely seaport Rotterdam and Amsterdam Airport Schiphol, and finally the availability of multi-lingual employees. In The Netherlands, traditionally most EDCs were established near one of the two main ports. In 1997, approximately 60 percent of the EDCs were located very close to airport Schiphol or seaport Rotterdam (BCI, 1997). However, a shift in location preferences and actual location behaviour of EDCs can be observed. In general, this is a shift from locations in or very close to the main ports towards locations near the German border. The two main reasons for this shift are the congestion in the main port areas and the desire to be located closer to customers (Kuipers, 1999; BCI, 1997; De Ligt, 1998).⁷¹

C. PERFORMANCE EXPECTATION

Although the EU has a common understanding of the business performance expectation of logisticians all over the continent, there are significant disparities, especially between the new and old members.

⁷¹ M.B.M. de Coster, P.M.J. Warffemius. *American, Asian and Third-Party International Warehouse Operations in Europe: A Performance Comparison*. International Journal of Operations & Production Management, August 2005, p. 765

Due to the varying degrees of use of technological devices such as RFID, providing logisticians with in-store and in-transit visibility of the goods and up-to-date logistics operations methods such as cross-docking, reducing the amount of inventory kept in warehouses also varies among EU members. Terms like “overnight air freight,” the “instantaneous tracking of goods in transit,” “electronic data interchange,” “just-in-time,” “materials resource planning,” and “distribution resource planning”⁷² are widely used in the European logistics arena. However, logisticians of the new members, most of which were a part of the former Soviet bloc, don’t have the same level of understanding of those performance measures as the Western and Northern European logisticians do. The new member countries have been filling the gap very swiftly, however, in the area of logistics and performance expectation among customers; and suppliers of those countries are getting closer to the citizens and companies of the old members. New warehouses with the latest technologies and operating methods in countries such as Poland, the Czech Republic, and Hungary in particular are significant indicators of this transformation.

Environmental performance expectation also varies among EU members. For instance, while the Germans evaluate environmental issues as vital, even to some other old members, like Italy, environmental issues aren’t of the same importance. Because the Soviet industrial system didn’t give the necessary attention to the damage of industrial processes to the environment, the business people of most of the new member states have a lesser degree of perception of this issue than their western colleagues.

Germany has very stringent packaging recycling requirements. A return packaging channel has been established: retailers must accept from the consumer any packaging that was used for the retail product. The retailer can then return this used packaging to the wholesaler or distributor from whom he received the product, along with any other packaging material that may have accompanied the product as it originally moved from the wholesaler to the retailer. Wholesalers and distributors have the right to return all the packaging to the product’s manufacturer.⁷³

⁷² Donald F. Wood, Anthony Barone, Paul Murphy, and Daniel L. Wardlow, *International Logistics* (New York: Chapman & Hall, 1995), 42.

⁷³ Ibid.

Those differences in performance expectations require logisticians to take the expectations of their customers into consideration, both at the EU level and the national level. There is a greater tendency in the old member countries than among the new members to invest more in issues like IT, warranties, and environmental care. This may cause global logistics managers to spend more money in the near future when new members complete their transformation and public opinion creates an expectation of higher performance of logistics operations. When a package is delayed for delivery for an additional two hours, it will have the same negative effect on a Latvian customer in the near future as it has on a Danish customer today.

D. INFORMATION TECHNOLOGIES

Information technologies are important for the realization of a European vision focused on mutual cohesion and inclusion. Income and productivity differences within the Europe Union have increased and will probably increase further with another EU enlargement. All of the European regions could improve their economic performance and people's overall quality of life by the development of information technologies.

1. Main IT Areas within the EU

The access to IT infrastructure is very important for EU countries, particularly in those areas where market conditions do not allow or generate sufficient investment. Those areas can range from e-commerce, using the Internet as a market tool, to the electronic provision of public services and information, to e-Government, the use of information technologies to inform people and receive their opinions.

Information technology development will affect most aspects of EU citizens' lives, as policies are as diverse as the regulation of entire industrial sectors or the protection of individuals' privacy. Within the European Union there is an IT plan that includes not only logistics issues, but also the protection of privacy and providing health-care, education, marketing, and safety. This plan advances seven priorities of information technology:

1. Broadband — a faster way to connect to the Internet
2. eBusiness — both e-commerce (buying and selling online) and the restructuring of business processes to make the best use of digital technologies
3. eGovernment — deliver better, more efficient public services and improve the relationship between citizens and their governments
4. eHealth — improving almost every aspect of healthcare, from making medical systems more powerful to providing better health information to everyone
5. eInclusion — overcoming social and geographical differences, ensuring an inclusive digital society that provides opportunities for all
6. eLearning — the integration of advanced information and communication technologies into the education system
7. Security — ensuring the security of both the infrastructure itself and the information that runs through it⁷⁴

All those IT priorities are directly related to the use of the Internet both in households and in enterprises. As mentioned in the Culture part of this study, there is a gap between the new members' and the old members' use of the Internet. The three EU countries with the least amount of enterprises with broadband internet service in their facilities are Poland, Slovakia, and Greece.

EU information technology policies range from those that help European industry develop new products and technologies to those that stimulate the acquisition of new services. Another IT function is the promotion of e-business: the development of policies such as the “eu” domain, a key player in the expansion of the European Union single market into the dimension of e-business. Another goal of these policies is improving the style of living of all Europeans through more effective, efficient, and accessible public services. These tools for creating a dynamic information technology environment, supported by secure broadband access, will encourage competitiveness and economic growth within the European Union. The information technologies can also improve road

⁷⁴ *Information Society Policies at a Glance* [Web site]; available from http://europa.eu.int/information_society/policy/index_en.htm; Internet; accessed 6 April 2006.

safety through the use of safety systems that are based on information and communication technologies to increase road safety and reduce the number of accidents on Europe's roads.

2. IT in Eastern and Central EU Countries

There is a big difference among European Union countries in regard to IT investments. Figure 18 below compares the levels of investment per capita in Eastern and Central European countries and Western Europe.⁷⁵ Greece's situation is unique in that it has the lowest level of investments in the European Union. Even some Eastern and Central European countries — such as the Czech Republic and Slovenia — have a higher level of investments. Thus Greece provides a useful means for measuring the various other countries' levels of information-technology development and preparedness for a global economy. Overall, however, the level of investment of the Eastern and Central European countries is only about one quarter of the average level of the Western European Union countries.

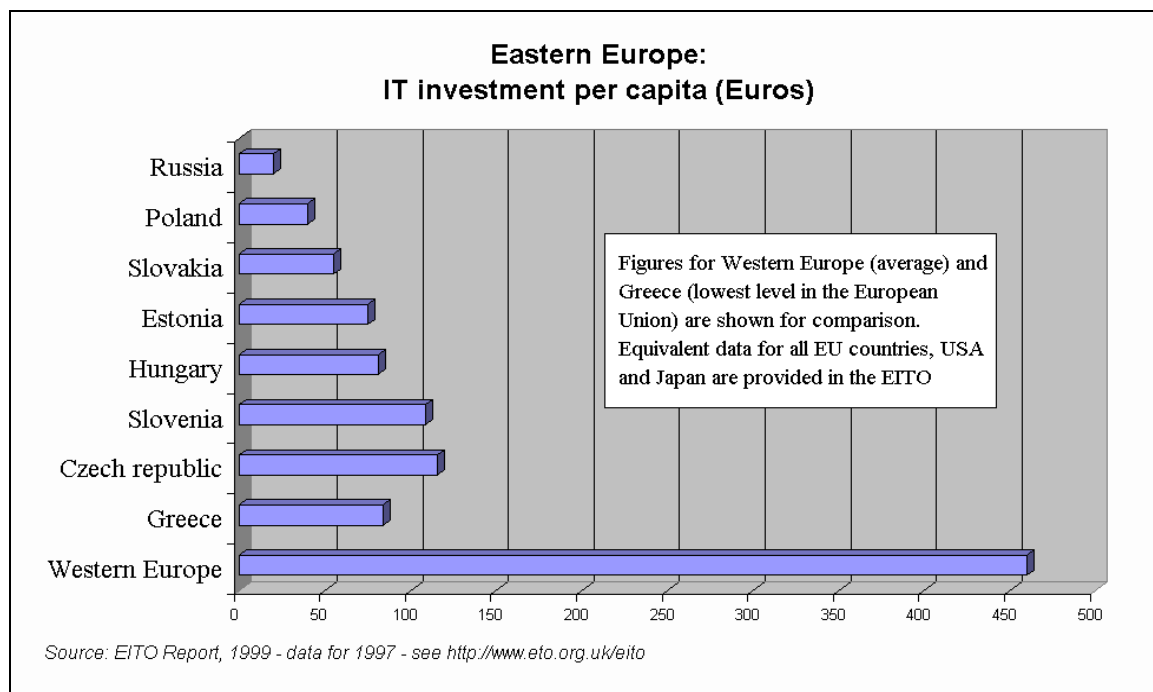


Figure 18. Absolute Levels of IT Investment (From: eto.org.uk, 2006)

⁷⁵ *Eastern European Countries: Levels of Investment in IT and Telecommunications* [Web site]; available from <http://www.eto.org.uk/eustats/east01.htm>; Internet; accessed 6 April 2006.

3. Radio Frequency Identification (RFID) Technologies

Nowadays, RFID technology has a high priority, and all developed countries spend a great deal of money implementing and developing such technology. This technology offers a lot of benefits for businesses: it can help managers control their inventory, track items and shipments, and increase efficiency in whole supply chains.

Spending on RFID deployments in supply chain applications in Western Europe reached \$185.8 million in 2004 and will reach \$575 million by 2009, according to Juniper. By comparison, in 2004 the second-largest market for RFID spending was retail, valued at \$92.9 million. By 2009, pharmaceuticals will be the second-largest RFID market, valued at \$408 million, and mass transportation will be the third-largest RFID market, valued at \$371.3 million. Retailer spending on RFID will reach \$315.6 million by 2009, making retail the fourth-largest RFID market. While spending will vary across industries, it will also vary from country to country. Spurred on by the government-backed “Chipping of Goods” RFID project in the U.K. and the RFID deployment of German retailer Metro Group, the U.K. and Germany account for 40 percent of the market for RFID in western Europe—a region that includes all the European Union countries and Switzerland. There are those who believe that in 2009, those two countries will still account for 40 percent of Western Europe’s RFID market.⁷⁶

European Union countries’ representatives are developing and preparing for the adoption of a EU-wide standard for RFID, which is crucial for their businesses and economies. The huge spending on RFID by the Western EU members is another IT disparity between the western and the eastern parts of the continent.

Figure 19 shows the relative rates of information-technology investment as a percentage of the national Gross Domestic Product of Eastern and Central European countries as compared to Western European countries.⁷⁷ This pattern is different than that depicted in the Figure 18 above. The difference lies in the Eastern and Central European countries’ greater effort to catch up with Western European countries in their information technology investments. So the investments of the Czech Republic and Estonia are even

⁷⁶ Jonathan Collins, “EU RFID Spending to Near \$1.9 Billion,” *RFID Journal*, March 2005 [journal online]; available from www.rfidjournal.com/article/articleview/1426/1/1/; Internet; accessed 5 April 2006.

⁷⁷ *Eastern European Countries: Levels of Investment in IT and Telecommunications* [Web site]; available from <http://www.eto.org.uk/eustats/east01.htm>; Internet; accessed 6 April 2006.

higher than the average level of the Western European Union countries. Information technology investments in Slovakia and Hungary are almost at the average European level.

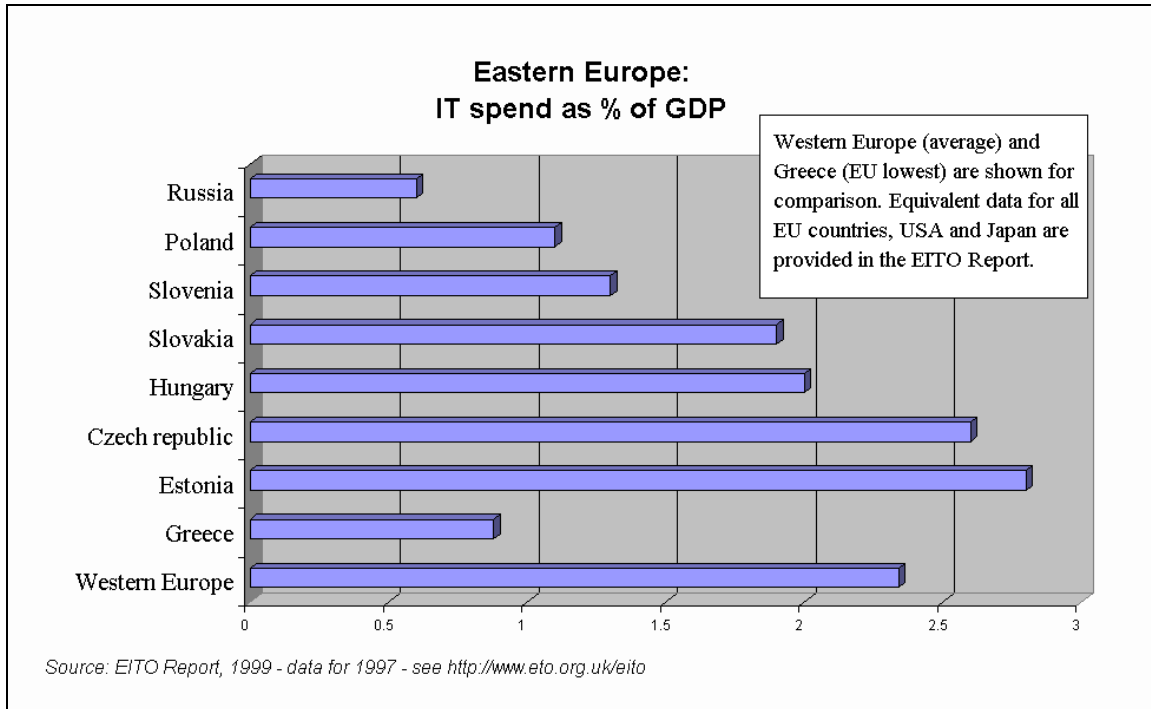


Figure 19. Investments Relative to National Wealth (From: eto.org.uk, 2006)

European Union representatives' main goal is to ensure that people have the skills and abilities necessary to make the most of the opportunities created by information technologies. These include being able to take advantage of distance learning and being educated in the knowledge and skills necessary in the modern world of information technologies.

E. HUMAN RESOURCES

Employment is one of the most significant issues within the EU. Thus there is a considerable effort to create more and better jobs for EU workers and guarantee equal opportunities for everyone who wants to work. In all, this means that European Union representatives pay close attention to the utilization of human resources.

Unemployment in the EU affects some regions more than others. It is particularly significant in areas where old industries have been closed and in remote regions where the investment in infrastructure is inadequate. The joint funds of the European Union are currently being used to increase development in areas of high unemployment, to create new jobs, and to improve infrastructure links and environmental issues.

In the 1950s, over 20% of people in the EU (only six countries at the time) worked in farming and around 40% in industry. By 2001, those figures had dropped to 4% and 29% for the EU-15. Most of the new jobs created in the EU-15 are in the services sector – which now employs two out of every three workers. Many new jobs involve data processing and the use of information technologies, which hold the key to the EU's future competitiveness. People are living longer and older people are enjoying better health. By 2030, the number of “older workers” (aged 55 to 64) will have risen by 24 million as the baby-boomer generation become senior citizens and the EU will have 34.7 million citizens aged over 80 (compared to 18.8 million today). Average life expectancy at 60 has risen five years since 1960 for women and nearly four years for men. The number of people 80+ will grow by 180% by 2050. From 2005 to 2030 the number of people 65+ will rise by 52.3% (40 mil), while the age group of 15–64 will decrease by 6.8% (20.8 mil). The ratio of dependent young and old people to people of working age will increase from 49 percent in 2005 to 66 percent in 2030. To offset the loss of working-age people, we will need an employment rate of over 70 percent.⁷⁸

Figure 20 indicates that the countries with the highest unemployment rate are Poland and Slovakia — two Central European countries — which have a rate of 17.2% and 15.9%, respectively, while Ireland and Denmark have the lowest unemployment rate.⁷⁹ This information demonstrates the regional differences between the Northern and Central European countries in terms of their unemployment rates.

⁷⁸ *The Jobs People Do* [Web site]; available from http://europa.eu.int/abc/keyfigures/eu_work/people_do/index_animated_en.htm; Internet; accessed 7 March 2006.

⁷⁹ *Harmonized Unemployment* [Website]; available from http://epp.eurostat.cec.eu.int/portal/page?_pageid=1996,45323734&_dad=portal&_schema=PORTAL&screen=welcomeref&open=/euro_lm/lm_un&language=en&product=EUROIND_LM&root=EUROIND_LM&scrollto=0; Internet; accessed 8 March 2006.

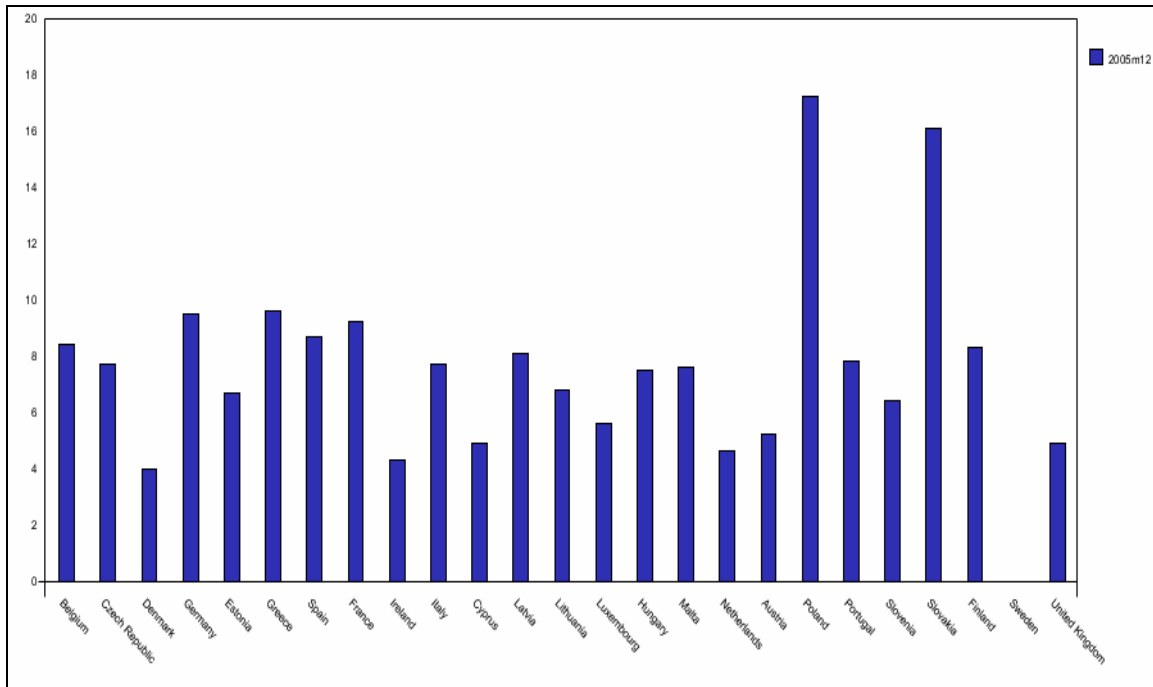


Figure 20. Unemployment Rates in the EU (in %) (From: epp.eurostat.cec.eu.int, 2006)

The changes and differences connected with the enlargement of the European Union have had a significant influence on citizens' and business companies' prosperity, on living standards, and on relations between the generations. Modern Europe has never had economic growth without births. The result of the constraints on families' choices are: late access to employment, job unsteadiness, expensive accommodations, and a lack of incentives. Incentives like family benefits, parental leave, and equal opportunities can have a positive impact on the birth rate. Many of these issues are the responsibility of the European Union member states, but they can also be considered as global.

Workers' mobility from the EU member states in Central and Eastern Europe to "old" members' states has had mostly positive effects and, in most countries, has been quantitatively less important than foreseen. Workers from these states helped to relieve labor market shortages and contributed to economic growth in Europe. For example, countries that have not closed their market to human resources from other EU member states — the UK, Ireland, and Sweden — have experienced high economic growth and a decrease of unemployment. As for the twelve EU countries using transitional measures, where workers managed to obtain access legally, this has contributed to a smooth

integration of these workers into the labor market. According to statistics, most countries have seen lower than expected worker flows from Central and Eastern Europe. There was no evidence of a surge in either the number of workers or welfare spending following enlargement as compared to the previous years.

Nonetheless, there are still some differences concerning labor flows. For example, Germany and Austria restrict the free provision of certain types of jobs, such as construction workers, housekeepers, house cleaners, in defined areas, on the condition that they also keep the national provisions that govern access to their labor markets. These restrictions are valid only for workers who are employed under the other EU member's state employment provisions. There are few other transitional necessities in the area of human resources.

The free movement of workers is one of the four fundamental freedoms of the EU, and recent experiences show that this has had no disruptive affect on EU labor markets. On the other hand, some individual countries and the European Union as a whole can benefit from it. Usually, the mobility of worker flows is determined by factors connected to supply and demand situations.

According to mutual agreement, the individual member states are supposed to decide whether to apply national restrictions on workers' free movement within the EU. These restrictions were introduced by all the "old" member states, except Ireland, Sweden, and the UK, to regulate the worker flows from the new Central and Eastern European member countries. Reciprocal limitations on worker flows in the opposite direction were introduced by three of the new member states: Hungary, Poland, and Slovenia.

What the new European Union atmosphere needs most is more children, a higher percentage of working females, and care for the increasing number of aged people. A malfunction in such areas could directly jeopardize Europe's future economic growth. The dilemma of present Europe is that its human resources are getting older and its younger generation is delaying having children.

III. EUROPEAN UNION REGULATIONS AND ITS TRANSPORTATION POLICY

A. EU REGULATIONS AND THE POLICY ON TRANSPORTATION

1. General Overview

When the European Union was established, part of its purpose was to form a common economic market, and, to accomplish this, one of its main tasks was the development and coordination of a continental transportation system. Thus, during its early period, as the EU established the necessary legal rules and regulations, it paid special attention to details pertaining to transportation, such as vehicle characteristics and safety. Though they were centrally established, the implementation of the EU policies, guidelines, and regulations are the responsibility of the individual member states. Major efforts focused on developing free competition and the interoperability of transportation systems, including the development of infrastructure and the unification of member nation transportation regulations. In addition, the EU developed investment projects aimed at creating connections between and the interoperability of all the European transportation systems. Since then, the EU has continued to develop and introduce a common transportation policy that emphasizes and supports its main goal: a sustainable transportation connection among the member states.

Because Europe's roads are heavily used and congested, the national rail system must, and is expected, to have the ability to shift loads away from roads. To do this, the developers must have the support of all the other transportation agencies, including the coastal shipping industry. According to existing plans, funds have been assigned for these projects and for the leverage of contributions from other sources. And many of the projects also have important benefits for truck transportation. These changes give EU members a distinct advantage because of the mutual effort to reduce cross-border obstacles and to resolve transportation issues at the national and international political levels. Nonetheless, the member states will also implement specific EU policies aimed at constraining an EU-wide implementation of some transportation policies.

During the last few decades, European transportation methods, especially road transportation methods, have changed significantly. As the demand for effective and flexible transport increased and the reduction of transportation time became more important, cars and trucks were used far more often. The changes in transportation largely occurred as a result of the development of international trade, which made the efficient transportation of goods within the EU essential for competitive trade and industry. The recent enlargement of the EU makes these changes even more important, given the related increase in the volume of goods being transported. Although additional enlargement is expected, it is currently somewhat restricted by economic and political factors.

Highway and road transportation in the EU includes a number of negative aspects, especially the increasing traffic density. This generally occurs in areas of the road network where a combination of an increasing number of private cars and heavy vehicles causes crowding and congestion. The capacity of the European transportation infrastructure is limited, and it is often impossible to identify potential bottlenecks. Congestion appears mostly in the center of urban landscapes, in large cities, and on the roads connecting them.

One region that is more affected than others is the region including Germany, Benelux, and France, where trade is of principal importance. It means that the economy of the region is significantly dependent on an efficient transportation system. The entire area depends on a functional infrastructure connecting the three countries. To solve the problems of this and other regions and to avoid simply building more roads, transportation engineers suggest a number of alternative solutions:

- a more efficient use of the current infrastructure,
- better economic management of transportation,
- better communication and cooperation among all transportation modes,
- better allocation of daily time,
- the introduction of transportation information systems, and
- shifting road transportation to other means of transportation.

As elsewhere, globalization has had a major impact on Europe's transportation networks. And for European Union members, the globalization of the supply chain has created both new opportunities and new challenges. The EU strategy of developing open borders, combined with the generally prosperous economic conditions, has resulted in substantial increases in car and truck transportation throughout the EU countries. New economic and trade conditions have resulted in an increase of traffic, especially truck movement. Thus an overcrowded and overloaded road network and accesses to intermodal terminals and ports have become significant problems, especially in urban areas and at critical natural geographic barriers, such as the Alps and the English Channel. In addition, there are also a number of environmental issues that must be addressed by the EU's regulations.

The importance of economic competition, especially in a global market, has raised economic development to a high level of importance. And the European Union has responded with many solutions and approaches to the challenges of developing both continental economic trade and a sufficient transportation infrastructure. For without a highly developed transportation infrastructure, modern countries cannot generate healthy economies and employment rates. This is especially the case within the European Union, where it is important to establish and maintain any missing connections and to eliminate any bottlenecks in the transport infrastructure. Otherwise, the quick and easy movement of goods and people among the member states will be impossible. A trans-European transportation network is a key element in the European strategy for economic prosperity and employment.

Among EU member states, the growth in transportation is expected to double by 2020. The investment required to complete and modernize a true trans-European network in the enlarged EU amounts to some 600 billion euros. On the basis of proposals from the member states, EU transportation experts have identified a series of thirty transnational axes. They were determined according to their European value and their contribution to the sustainable development of transport and the integration of the new member states. The trans-European network also includes major technological projects for industry. Galileo, the European system for satellite radio-navigation, is a priority project offering

extremely accurate navigation and positioning facilities, such as for route planning. It will also transform freight carriage by supplying continuous information on the movements of goods.⁸⁰

2. Road Transportation

Numerous regulations and policy instruments are needed to set a process in motion that will lead to a sustainable road transportation system. Even if many aspects of the transport policy are solved by national governments, it is important for the single European market to have a single transport infrastructure. In the last several years, the EU has opened national transport markets across the Union to competition. As a result, trucks can now operate in countries other than their own: they can transport not only to but also from other countries, and no longer must return empty. This is obviously a much more efficient use of international roads as well as a mutually more beneficial way to conduct international commerce.

Because most transport within the European Union is regulated at the international level, the EU must establish a workable regulatory framework for inter-Union transports. It is finding it very difficult, however, to develop a common transportation policy, because the EU members all have policies that primarily protect their domestic markets. Now that the enlargement of the European Union has extended the trans-European network across the continent, the European countries must make a joint effort to review current laws and regulations. This is a necessary first step toward formulating a sustainable transport system and tackling the problems of congestion and pollution.

The adoption of new road transportation regulations does not appear to pose any significant problems for the new members of the EU. They are already linked to the European network and have concluded international agreements covering road transportation. Development of those links is a precondition for economic development based on future growth in transportation. The EU's common transport policy has two

⁸⁰ *The Networks Are Essential for the Citizens and the Economy of the European Union* [Web site] (EUROPA-European Commission-Transport, 2001); available from http://europa.eu.int/comm/ten/transport/priority_projects_minisite/index_en.htm; Internet; accessed 3 May 2006.

main goals. The first is the establishment of an efficient, accessible, and competitive transport system. This is essential for continued economic growth and employment and to keep EU businesses competitive. The second goal is a high level of safety and environmental protection.

The unprecedented enlargement of the next few years will give the Union a truly continental dimension. Though its maximum extent already exceeds 4,000 km, for example, between the south of Spain and the north of Finland, enlargement will extend the Union's uninterrupted landmass to more than 3,000 km, for example, between Lisbon and Constanza in Romania. Its fleet is set to increase substantially, given that the flags of Cyprus and Malta alone represent a tonnage almost equivalent to that of the current Community fleet.⁸¹

Figure 21⁸² shows that the transportation costs of new-member and candidate states are lower than the average transportation costs of the European Union. The only exception is Slovakia, where costs per kilometer of international road haulage are higher than the European average.

⁸¹ *Managing the Globalization of Transport: European Transport Policy* [publication online] (EUROPA-European Commission-Transport, 2000); available from www.eu.int/comm/energy_transport/library/lb_texte_complet_en.pdf; Internet; accessed 14 April 2006.

⁸² *European Transport Policy for 2010: Time to Decide* [publication online] (Office for Official Publications, 2002); available from <http://www.espo.be/downloads/archive/b00c2714-bd6a-4aaf-9a03-7da5accf5fdb.pdf>; Internet; accessed 14 April 2006.

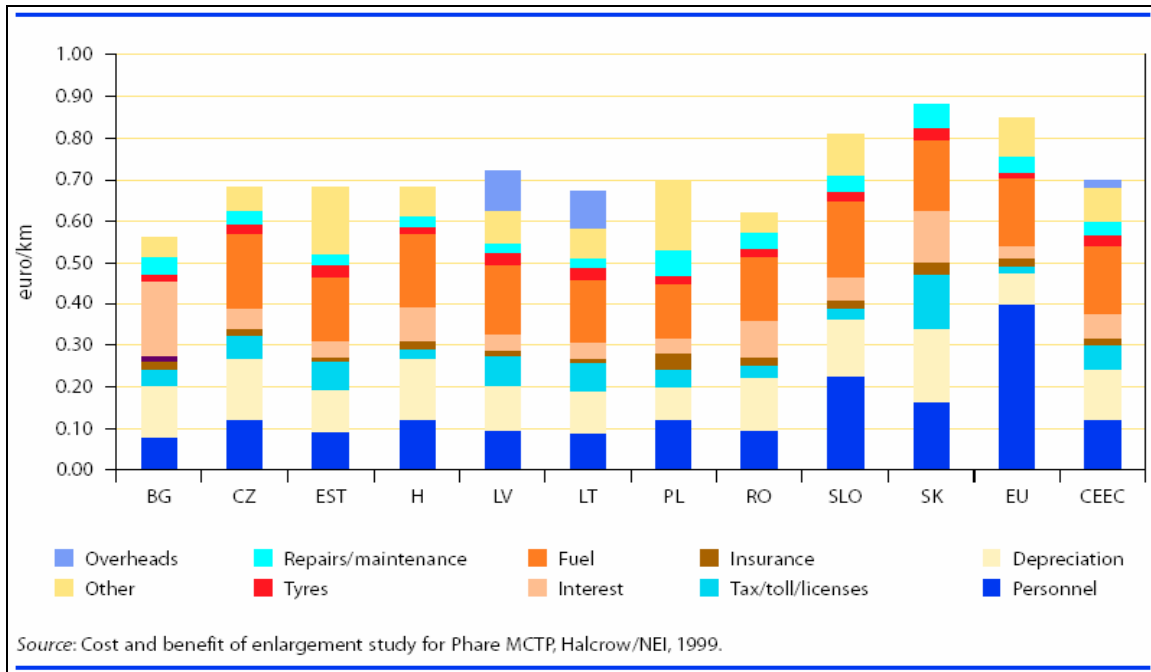


Figure 21. Cost per Kilometer of International Road Haulage (From: espo.be, 2006)

To reach sustainable mobility in Europe, the EU must develop regulations that implement improvements in five essential areas of the transportation network.

a. A More Efficient Integration of and Use of Environmentally Friendly and Energy-Saving Transport Modes

One of the best indicators of an increase and improvement in citizen welfare and industrial growth is an increasing demand for better modes of transportation. This factor evidences the importance of trans-European networks that allow interoperability and interconnection among all the states of Europe. Because of congested roads and environmental issues, Europeans are calling for transport policy regulations aimed at shifting transport from road to rail and, more specifically, at combined transport. This orientation emphasizes the possibilities that would be opened up by the development of an inter-modal approach. Some objectives to be met include:

- Setting in place the framework for a rail/road-based, combined transport system that would provide a wide coverage for the EU community and would divert a substantial tonnage from the community's congested road network.
- Associating with this rail/road-based system an inter-modal approach embracing waterways and maritime services that would provide additional

and complementary facilities and, in the case of certain maritime links, notably to Greece, Ireland, and the Iberian Peninsula, would ensure that islands and other remote regions of the Community are adequately served.⁸³

The sustainable mobility can be improved also by more efficient railways, better transshipment points, improved conditions for combined transport, and high technical standards. Avoiding unnecessary transport, increasing the market share of environmentally friendly modes, and minimizing the burdens caused by road vehicles can all make a significant contribution to the realization of a more efficient integration of transportation modes. No single measure on its own is sufficient to reach the goals of sustainable mobility in Europe.

b. Implementation of New Technologies

For all concerned, the implementation of new technologies would be a major benefit: for individuals (driving would be safer); for transport service providers (it would provide logistical and management support); for road operators (would create more effective traffic patterns and less congestion); and for the environment (by reducing pollution and a more efficient use of energy sources). The use of new technologies would also provide new market opportunities for European industries and service providers. There are five priority areas for the implementation of new technologies:

- Traffic Information Systems
- Traffic Data Exchange and Information Management: Their main action in these two areas is to create a framework for the use of technical standards and operating protocols. This should be done by way of voluntary Memoranda of Understanding between the actors involved.
- Electronic Fee Collection: The key action here is to devise and implement a strategy to achieve convergence between existing and new systems to ensure an appropriate level of interoperability Europe-wide.
- Human–Machine Interface: A code of practice will be developed to ensure onboard telematic devices do not impair driver performance or cause discomfort.

⁸³ *Communication from the Commission Concerning the Creation of a European Combined Transport Network and its Operating Conditions* [publication online] (EU Commission, 1992); available from <http://aei.pitt.edu/2942/>; Internet; accessed 16 April 2006.

- Systems Architecture: The aim is to define a European open-system architecture.⁸⁴

Such a policy could make a significant contribution to the economic growth of all the EU members, increasing mobility and the number of employment opportunities.

c. Improvement of Road Safety

With unchanged policies, about 1 in 80 European citizens will die on average 40 years too early and 1 in 3 European citizens will need hospital treatment during their lifetime as a result of road accidents. The annual road toll of 45,000 people killed and 1.6 million injured represents an unacceptably high burden on Europe's society and economy.⁸⁵

The improvement of road safety will make an important contribution to reducing the number of road accident victims. The EU member states' representatives should take into account the high costs of accidents. Examples of some regulations for improvement include: more pedestrian-friendly car design, required seat-belt wearing, and reduction of speed limits.

d. Adaptation of the Taxation and Toll Policy

One solution that could eliminate inequality in a competitive use of roads is to adapt the taxation and toll policy. Motor vehicle taxation, excise fuel taxes, and tolls regulate some of the fiscal aspects of road transportation. Such policies should ensure that at least marginal costs will be covered, whilst providing possibilities for recovering the total costs. In the final stage, the following basic aims must be attained:

- Allocation of economic and social infrastructure costs to users
- Harmonization of competitive conditions both within and between modes of transportation
- Sufficient tax revenue for each member state

⁸⁴ *Community Strategy and Framework for the Deployment of Road Transport Telematics in Europe and Proposals for Initial Actions* [publication online] (EU Commission, 1997); available from <http://aei.pitt.edu/4719/>; Internet; accessed 16 April 2006.

⁸⁵ *Promoting Road Safety in the EU* [publication online] (EU Commission, 1997); available from <http://aei.pitt.edu/4729/>; Internet; accessed 16 April 2006.

- Free and unhindered flow of goods and persons within the EU community⁸⁶

In connection with the above mentioned aims, it should be borne in mind that the tax and economic conditions differences between member states are very wide. It is also necessary to take into account the interests of transit countries that are not member countries.

Taxes on fuel complete the transport infrastructure charging picture by adding external costs to the prices paid by users. In particular, they incorporate the external cost component linked to greenhouse gas emissions. With the road transport sector now fully opened up to competition, the absence of harmonized fuel taxes seems increasingly to be an obstacle to the smooth functioning of the internal market.⁸⁷

e. Harmonization of Social Conditions

Within the European Union there is a lack of regulations to regulate the social conditions of road transport. This may be one reason for the extreme competitiveness in the road transportation sector. Nevertheless, there are some good common regulations. One of them is a harmonization of the driving time at a maximum of 48 hours per week on average, except for self-employed drivers. A majority of the common regulations are designed to provide full legislation that would improve working conditions and road safety and ensure compliance with the rules of all the member states. In particular, the laws seek:

- to reorganize working time; though self-employed drivers are excluded, this proposal will regulate working time throughout Europe, establishing an average working week of 48 hours and a maximum of 60 hours; and

⁸⁶ *Elimination of Distortions of Competition of a Fiscal Nature in the Transport of Goods by Road* [publication online] (EU Commission, 1997); available from <http://aei.pitt.edu/4016/>; Internet; accessed 18 April 2006.

⁸⁷ *European Transport Policy for 2010: Time to Decide* [publication online] (Office for Official Publications, 2002); available from <http://www.espo.be/downloads/archive/b00c2714-bd6a-4aaf-9a03-7da5accf5fdb.pdf>; Internet; accessed 17 April 2006.

- to harmonize weekend bans on lorries; this proposal seeks to align the national rules in this area and introduce an obligation to give notification before such bans are imposed; on adapting the way work is organized in haulage companies.⁸⁸

The problem with the European Union regulations on road transportation is that they are not only insufficient, but also very inadequately imposed. Table 5 shows an example of the regulation variety among the old member states concerning permitted speed limits and blood alcohol levels.⁸⁹

	B	DK	D	EL	E	F	IRL	I	L	NL	A	P	FIN	S	UK
Built-up areas (km)	50	50	50	50	50	50	48	50	50	50	50	50	50	50	48
Trunk roads (km)	90	80	100	110	90	90	96	90	90	80	100	100	80	90	96
Motorways (km)	120	110	(70)	120	120	130	112	130	120	120	130	120	120	110	112
Blood alcohol level (mg/ml)	0.5	0.5	0.5	0.5	0.5	0.5	0.8	0.8	0.8	0.5	0.5	0.5	0.5	0.2	0.8
Source: European Commission and Member States.															

Table 5. Permitted Speed Limits and Blood Alcohol Levels of Old EU Members
(From: europe.eu.int, 2006)

The EU pays significant attention to the use of technology for effective transportation on the continent; its use of Galileo, for example, is one of the most important events in this area. Galileo is the name of the European Satellite Navigation System which will be fully operable in 2008 by the EU and the European Space Agency. It will be a world-wide system that is interoperable and compatible with today's GPS system, enabling a single receiver to use both GALILEO and GPS signals.⁹⁰ The system will help EU members establish a highly efficient and precise transportation system.

⁸⁸ *European Transport Policy for 2010: Time to Decide* [publication online] (Office for Official Publications, 2002); available from <http://www.espo.be/downloads/archive/b00c2714-bd6a-4aaf-9a03-7da5accf5fdb.pdf>; Internet; accessed 22 April 2006.

⁸⁹ *Traveling in Europe 2005* [publication online] (Europe – European Commission, 2001); available from http://www.europe.eu.int/comm/publications/booklets/eu_glance/57/en.doc; Internet; accessed 15 April 2006.

⁹⁰ *Galileo: European Satellite Navigation System: European and International Co-Operation* [Web site] (Europe – European Commission, 2000); available from http://europa.eu.int/comm/dgs/energy_transport/galileo/international/cooperation_en.htm; Internet; accessed 24 April 2006

Galileo is based on a constellation of 30 satellites and ground stations providing information concerning the positioning of users in many sectors such as transport (vehicle location, route searching, speed control, guidance systems, etc.), social services (e.g., aid for the disabled or elderly), the justice system and customs services (location of suspects, border controls), public works (geographical information systems), search and rescue systems, or leisure (direction-finding at sea or in the mountains, etc.).⁹¹

3. Rail Transportation

a. The Need for Transformation

After having a significant role in European commerce for many years, the during the last three decades, railways' share in the transportation market was drastically reduced. "It's estimated that during the period 1990–2001, measured in tons/kilometers, freight transport in general rose by 25%, and road transport increased by 35% while rail freight transport decreased by 6%."⁹² Figure 22 shows the striking difference between rail freight and road freight transportation in the European transportation market from 1970 to 2001.⁹³ During the same period, rail passenger transportation declined 4 percent, which indicates the greater problem for rail transportation. The railways' loss has been the airlines' gain, as their share of passenger transportation has risen four times in the same market over the last thirty years.

⁹¹ *Galileo: European Satellite Navigation System: A Permanent Reference in Time and Space* [Web site] (Europe – European Commission, 2000); available from http://europa.eu.int/comm/dgs/energy_transport/galileo/index_en.htm; Internet; accessed 12 April 2006.

⁹² Loris Di Pietrantonio and Jacques Pelkmans, *The Economics of EU Railway Reform* [publication on line] (College of Europe, 2005); available from <http://www.coleurop.be/content/studyprogrammes/eco/publications/BEEPs/BEEP8.pdf>; Internet; accessed 16 April 2006.

⁹³ Ibid.

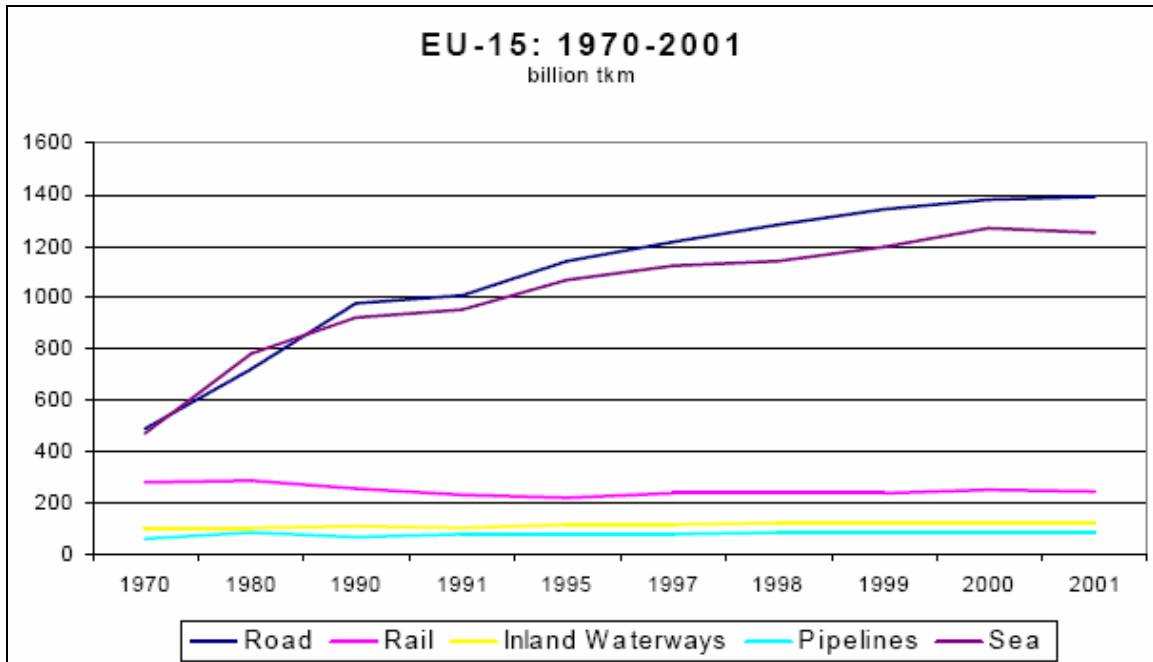


Figure 22. Growth and Share of Freight Transport by Modes between 1970 and 2001
(From: coleurop.be, 2006)

One reason for the bad situation that EU railways are in today is changes in the European business sector that have had a major impact, in particular, on freight transportation. Today's customers require vendors to handle orders in a shorter time and with greater elasticity than was the case when the railways had a large share in the market. Those two requirements, greater speed and elasticity, are more in line with air and road transportation than with today's inefficient and inelastic rail transportation. Especially after the EU's integration of the new members — with the exception of Malta and Cyprus, which don't have railways — goods are moving day and night across many European countries in huge amounts. Due to a lack of cooperation among member states' railway operators, the railways have not been able to extend, as required, beyond their national borders into the international arena.

b. EU Railway Regulations and the Creation of the European Railway Agency

The history of the EU's three main railway regulations is summarized below.

The European Commission has adopted three main railway reforms since 1991 in order to improve the railway infrastructure and operating methods in the member states. The European Commission has adopted a step-by-step approach, which has materialized through three stages of regulation and liberalization. The first one has been established by Directive 91/440 on the accounting separation between infrastructure and operations. This Directive was complemented by a follow-up in 1995 (Council Directive 95/18/EC) on the licensing of railway undertakings and one on allocation of railway infrastructure capacity and the levying of charges (95/19/EC). The follow-up was a timid attempt to introduce open access in the limited forms of international access through “international groupings” of railway undertakings (mainly incumbents). A second step of reforms at EU level, which entered into force on 15 March 2003, goes under the name of the First Railway Package. The first railway package, though only referring to rail freight, represents an attempt of liberalizing the sector through the introduction of open access and forms of head-on competition at least on the TERFN (50% of EU railway networks and 80% of traffic) and later on the whole network (by 2006 according to the recently approved Second Railway Package). However, a number of technical directives had to be added so as to eliminate technical and legal barriers. This has been accomplished with the Directives on Interoperability of High-Speed (96/48) and Conventional rail (2001/16). A third step of reforms was made with the second railway package (2004, see note 48): a directive for the harmonization of safety requirements and certifications that are currently different in all Member States, and a regulation for the creation of a European Railway Agency for Safety and Interoperability. The completion of EU liberalization and regulation is pursued with the (pending) approval of the proposed third railway package that includes passenger service liberalization by 2010, harmonization of train drivers’ licenses, the inclusion of passenger rights requirements and freight service quality.⁹⁴

The European Railway Agency was established on April 29, 2004, under the direction of the third reform to improve the railway sector in member countries. Improvement was to be accomplished, in particular, by developing the interoperability among different railways and by increasing safety within the entire EU railway network. All member countries are required to follow the rules stemming from the agency’s regulations. Safety and interoperability are two main areas to be improved in the EU railways with the help of technical assistance from the European Railway Agency.

⁹⁴ Loris Di Pietrantonio and Jacques Pelkmans, *The Economics of EU Railway Reform* [publication on line] (College of Europe, 2005); available from <http://www.coleurop.be/content/studyprogrammes/eco/publications/BEEPs/BEEP8.pdf>; Internet; accessed 16 April 2006.

The primary reason behind the establishment of the railway agency was the need to transfer the heavy load of roads to the railways. Currently, however, the railways lack the necessary infrastructure to meet this requirement. During the last thirty years, rail freight in Europe has experienced an almost 60 percent decline in terms of its share of freight transportation across the continent. Road transport, on the other hand, which has carried most of the goods, has increased significantly with the growth of the overall economy on the continent.

In addition to the environmental damage and high traffic congestion created by road transportation in Europe, another significant motivator for EU officials to establish a modern and interoperable railway network across the continent is the fact that railway transportation is much safer than road transportation. There were only 93 fatalities on EU railways in 1996, while 43,500 passengers died on EU roads in the same year.⁹⁵ To stop accidents, EU railways must be more responsible in two important areas: technical and managerial. Technical reform consists mainly of standardization: of the track gauges, power supplies, rolling-stock technology, and signaling techniques.⁹⁶ Managerial efforts must focus on inspecting, maintaining, and enforcing safety measures. The measures provide EU railways not only with greater safety but also with the greater interoperability capabilities required for the establishment of a trans-European rail freight network that is expected to be completed in 2008.

Directive 2001/12/EC defines a trans-European rail freight network (TERFN) comprising approximately 50,000 km of line open to European freight services by 2003. Any European company holding a licence may use these lines and compete with other companies by offering new services. As of 2008, however, the European freight services market will be opened up over the whole 150,000 km network. The TERFN is just an interim solution.⁹⁷

⁹⁵ Di Pietrantonio and Pelkmans.

⁹⁶ *High-Speed Rail* [Web site] (Wikipedia – High Speed Railway, 2006); available from http://en.wikipedia.org/wiki/High-speed_rail#Countries_currently_with_high-speed_rail; Internet; accessed 22 April 2006.

⁹⁷ *White Paper "European Transport Policy for 2010: Time to Decide"* [publication online] (Office for Official Publications, 2002); available from http://europa.eu.int/comm/energy_transport/library/lb_texte_complet_en.pdf; Internet; accessed 16 April 2006.

c. *The Need for High Participation*

As mentioned in the “White Paper,” European Transport Policy for 2010: Time to Decide,” the EU’s primary transportation policy document, the crucial transformation of the European railways can only be achieved with the strong participation and commitment of many agencies and unions in the member states.

The growing awareness on the part of the operators who recently engaged on a joint definition of a common strategy for European rail research to create a single European railway system by 2020, must be welcomed. In this document signed by the International Union of Railways (UIR), the Community of European Railways (CER), the International Union of Public Transport (IUPT), and the Union of European Railway Industries (UNIFE), the rail stakeholders agree to achieve the following objectives by 2020:

- for rail to increase its market share of passenger traffic from 6 to 10% and of goods traffic from 8 to 15%;
- a trebling of manpower productivity on the railways;
- a 50% gain in energy efficiency;
- a 50% reduction in emissions of pollutants;
- an increase in infrastructure capacity commensurate with traffic targets.⁹⁸

The first requirement for achieving those goals is promoting the general idea among European railway operators that railway transportation is vital for an entity, the EU, with the second largest economy in the world. Statistics show that if member states fail to fulfill the responsibilities outlined in the EU regulations, the EU’s share of rail freight transportation will fall to 7 percent by 2010. In contrast, rail passenger transportation is expected to keep its share at 6 percent until that year.⁹⁹

d. *Marco Polo Program*

Under the guidance of the White Paper, the European Commission (EC) defined a roadmap for increasing the market share of railways. Member states are expected to bring the market share of modes of transportation back to the 1998 level by

⁹⁸ *White Paper “European Transport Policy for 2010: Time to Decide”.*

⁹⁹ *Ibid.*

2010.¹⁰⁰ To achieve this goal, the Marco Polo Program, endorsed in 2003, is aimed at increasing intermodal transportation within the EU while, at the same time, decreasing the negative effects of road transportation on the environment and the transportation system as a whole. Marco Polo II will be launched in 2007 and be effective until 2013. This program consists of additional precautions aimed at creating a more effective transportation system in the EU.¹⁰¹

The program, which has a budget of €740 million for 2007–2013, has been extended to countries bordering the EU. The Commission estimates that every €1 in grants to Marco Polo will generate at least €6 in social and environmental benefits.¹⁰²

4. Inland Water Transportation

Compared to other transportation modes, inland waterway transportation has several unique advantages. It is cheap, environmentally friendly, safe, and energy efficient, and it reduces congestion on the other modes of transportation. In comparison with others, the ton/km cost of inland transportation is much lower. It also needs minimal infrastructure and vessel capacity. Unfortunately, these advantages do not play an important role for shippers in deciding which mode of transportation to use. Currently, the European Union is developing a policy for better use of inland water transportation as part of its effort to solve the problems of road and rail saturation, transport safety, environmental damage, energy conservation, and better quality of life.

Some regulations within the European Union already affect inland transportation, but they were legislated so as not to conflict with the laws of individual member states. Consequently, they are subject to the conditions of the overall free market. At present, there are differences among the individual nations' laws governing the commercial operation of inland waterway transport. An EU initiative aims to unify those various rules

¹⁰⁰ *The Marco Polo Programme (2003-2010)* [Web site] (EUROPA – European Commission – Transport); available from http://europa.eu.int/comm/transport/marcopolo/index_en.htm; Internet; accessed 14 April 2006.

¹⁰¹ *Marco Polo II (2007-20013)* [Web site] (Polloco – Marco Polo, 2006); available from http://www.polloco.pl/marco_polo/marco_polo2_ang.htm; Internet; accessed 24 April 2006.

¹⁰² *The Marco Polo Programme (2003-2010)* [Web site] (Polloco – Marco Polo Programme, 2006); available from http://europa.eu.int/comm/transport/marcopolo/index_en.htm; Internet; accessed 24 April 2006.

and laws in order to make the internal market function more smoothly. The initiative would allow the free movement of goods, persons, services, and capital. In the free market, in general, European inland water transportation could be adjusted by the organization of chartering by rotation, so as to move toward greater commercial flexibility and a system of open transactions. Many shippers fear, however, that, because of the existing overcapacity, increasing the open market would engage them in ultimately ruinous competition. This also explains their reluctant support of liberalization. To further improve the current situation in inland waterway transport, EU representatives should also standardize the technical requirements for all member states.

But the systems of chartering by rotation (mentioned above) should be regulated by the member states themselves. Chartering by rotation systems consist of allocating requests from customers for transport operations on the basis of the order in which boats become available after unloading and are registered by their owners in a charter exchange. Carriers entered on the rota are invited, in the order of their registration, to choose a load from those on offer for which they meet the required conditions. Those who do not immediately choose a load nonetheless keep their position in the order. In this type of rotation system, prices are fixed either by a public authority or by a multisector organization. For shippers, the system guarantees a minimum profit and thus, at least a minimum income. For shippers also, however, rotation limits competition and prevents them from choosing the carrier, though they can stipulate the conditions governing transport and the quality of the vessel. Rotation systems organized and administered by public authorities comprise a method of allocating contracts that has fixed tariffs and restricted competition between carriers. Legally, an investigation should be done to determine whether national laws or regulations that introduce nondiscriminatory systems of rotation and fixed prices are compatible with the obligations of a regulatory nature on EU member states. This might render ineffective the competition rules applicable to such undertakings.¹⁰³

¹⁰³ *The Organization of the Inland Waterways Transport Market and Systems of Chartering by Rotation* [publication online] (EU Commission, 1994); available from <http://aei.pitt.edu/4705/>; Internet; accessed 16 April 2006.

Implementing such a system can improve the overall quality of inland water transportation and promote greater continuity and stability in the satisfaction of transport needs in markets where supply and demand are subject to considerable temporal fluctuation. However, all restrictions on competition must be essential to the achievement of these objectives, and competition must not be eliminated in respect to a substantial part of the transport market concerned. A shipper who intends to use inland waterways transport must first invest heavily for things such as quays, handling equipment, skilled staff, etc. Such investment is generally considered a discouragement. Therefore, the member states should encourage shippers to set up structures for commercial cooperation that will act in compliance with the European Union rules governing competition.

B. EU REGULATIONS AND POLICY ON LOGISTICS PROCESSES

Europe's historic diversity and economic separatism make achieving true supply chain innovation a difficult task for many companies. Europe's governmental, commercial, and legal practices and policies have led to considerable removal of barriers to trade and the flow of goods and services with the EU. On the other hand, at times they can appear heavy-handed in their approach to managing commerce. Europe faces significant infrastructure challenges as it tries to grapple with burgeoning trade growth. While border checkpoints with the EU have been practically abolished and thereby do not impede the free movement of goods, European logistics operators must still contend with Central Europe's inadequate motorway networks. Europe still has borders and regulations that can hamper supply chain efficiency and responsiveness. Accordingly, logisticians, and the companies that employ them, must plan ahead, taking into account different requirements associated with efficient routing. People on the ground must be aware of which are the 24-hour ports, which facilities use the latest IT systems, and where border crossings are quickest. On the regulatory side, one must know how to select one route or mode over another in order get a specific type of cargo to the customer on time. At times, borders or regulations exist to justify bureaucratic jobs, and at the end of the day, efficiency may not be what some bureaucrats want. The providers and users of transport/distribution services in Europe have an important role to play in orchestrating change within the EU. Change must not be left solely to lawmakers and regulators. The private sector must participate actively in the policymaking activities in individual

countries and the EU, and assure that lawmakers look to industry for guidance so as to achieve the desired public policy while at the same time assuring logistical efficiency.¹⁰⁴

An integrated and consistent logistics system uses compatible processes based on European and international principles. Logistic regulations and policies are in accordance with regional and trade development. European electronic platforms are created for easy information exchange and dissemination of knowledge, including, for example, business transactions, e-administration, and benchmarks. Europe can achieve the best logistics efficiency in the world and has the ability to maintain it. The logistics system is also able to offer cost-efficient solutions to a variety of needs. According to the European regulations and policy, logistic resources in Europe should be deployed optimally to provide the well-organized and sustainable movement of goods to and from and within its territory. The development of human resources focuses on the improvement of logistics processes and technology. Then Europe will provide businesses with an efficient operational and technological method and will prosper in the global marketplace. It is important that the Europe Union offer equal conditions for companies and individuals to succeed and prosper in stimulating environments across its territory. All these regulations must be directed at enabling Europe's competitive environment to generate the values needed to sustain European society at the appropriate level. Commerce needs regulations and policies that allow it to function dynamically in accordance with the economy it sustains. The role of particular European regions will increase in relation to these regulations and key investments connected with the logistics.

Better customization and appropriate responsiveness will determine the evolution of chain configurations. There are many new and different chain forms and also hybrid chains in the current European logistics system. Areas like supply network engineering, especially, require innovation both in the product and the technology. Delivery of products and services to homes will become more important. Transportation costs are increasing due to labor costs, overcrowding, oil prices, and transport tolling. The cost of

¹⁰⁴ Richard K. Bank, *Can Europe Shed Its Shackles?* [publication on line] (Vision, 2006); available from http://www.catlogistics.com/s_vision/vision_winter05_2-4_viewpoint.html; Internet; accessed 26 April 2006.

ensuring safety and security is also more and more important for the total logistic costs. These costs can increase the price of logistics services dramatically. New European Union regulations will be more focused also on reverse logistics as this becomes more important. Then manufactures and importers will be forced to ensure environmentally friendly products and their commercial returns.

Standardization of public sector policies and regulations and additional investments in infrastructure are important for abolishing so-called border effects. In accordance with the current development of information technology (IT), logistics elements will become more networked. Therefore, systems like enterprise resource planning (ERP) need to be linked together between these elements. Such network organizations will outsource many activities with the highest level of quality and this technology, with different layers of suppliers, will be developed based on cost efficiency. On the other hand, while strong companies in logistics grow even stronger, small and specialized companies will appear. Then, cooperation among these companies will become common practice, where all participants seek cooperation. IT, transport, and warehousing are the best examples of such policies, because of their increasing scalability. Also, the role of third-party logistics providers will increase and multipurpose warehouses will be replaced by specialized warehouses. Supply chain systems will be differentiated in accordance with the characteristics of the product, but also based on the different needs and expectations of different customer entities. Another area where the new EU regulations will be implemented is asset-tracking, and its importance will increase, to leverage efficiency and to avoid waste.

New and better international European regulations and standards for logistics processes are needed, which must be linked to international standards to prevent duplication. On the other hand, European Union policy makers should be careful about making Europe too expensive by over-regulating. These authorities must fully understand the connection between competitiveness and logistics efficiency.

IV. RECOMMENDATIONS FOR TURKEY AS A CANDIDATE

A. HISTORY OF TURKEY–EU RELATIONS

The EU's relationship with Turkey dates back forty-seven years, to July 31, 1959, when Turkey applied for membership in the European Economic Community (EEC). Since Turkey lacked the necessary qualifications for membership at the time, the EEC responded by directing Turkey to make essential developments in numerous areas. On September 12, 1963, Turkey signed the Ankara Agreement with the EEC, which enabled it to join the Customs Union. On November 23, 1970, with the signing of an Additional Protocol, the Customs Union declared the technical developments that were required of Turkey. On January 22, 1982, the EEC suspended its relations with Turkey; they would not be reopened for several years. Turkey applied for full membership in the EEC on April 14, 1987, and became a member of the Customs Union on January 1, 1996. This represented significant progress within the process toward full EU membership. And at the Helsinki Summit from December 10 to 11, 1999, Turkey was accepted as a candidate for EU membership. The EU Council of Ministers recognized the EU–Turkey Accession partnership in March 2001, and the Turkish government presented its National Program for acceptance that same month.¹⁰⁵ “On 13 December 2002, the Copenhagen European Council resolved that if the European Council in December 2004, on the basis of a recommendation from the Commission, decides that Turkey fulfils the Copenhagen political criteria, the EU would open accession negotiations.”¹⁰⁶ The most significant development in EU–Turkey relations happened on December 17, 2004, with the commencement of formal EU–Turkey negotiations for the accession.

B. TURKEY: A POTENTIAL GLOBAL LOGISTICS HUB

Turkey's strategic position as a bridge between Europe and Asia, and the Black Sea and the Mediterranean Sea, creates a great potential for Turkey to become a leading

¹⁰⁵*Key Events in Turkey-EU Relations* [Web site] (EUROPA – European Commission Enlargement, 2005); available from http://europa.eu.int/comm/enlargement/turkey/key_events.htm; Internet; accessed 18 April 2006.

¹⁰⁶ Ibid.

logistics center. “Turkey is a major player both as a transit country and as an origin and destination of freight.”¹⁰⁷ In addition to its considerable economic relations with the EU, Turkey’s trade with the Turkic countries in the Middle Asia, the Black Sea countries, Middle East countries, and Balkan countries make Turkey the biggest economic power in the region. In 2004, it had a GDP of more than 500 billion dollars in purchasing power parity and a growth rate of more than 9 percent.

Figure 23 illustrates Turkey’s excellent location in terms of its closeness to various trade regions.¹⁰⁸ Turkey is a production center of a great variety of commercial goods. In addition to its famous textile industry, its electronic and automotive sectors are two other important components of Turkey’s dynamic industry. In terms of human resources, Turkey has a significant advantage: its population of 70 million, with a median age of twenty-eight, provides it with a unique labor force of well-educated and skilled workers.



Figure 23. Regions Servable from Turkey (From: aksaray.gov.tr, 2006)

¹⁰⁷ *Railways Restructuring Project* [Web site] (Worldbank – Turkey, 2005); available from <http://www.worldbank.org.tr/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/TURKEYEXTN/0,,contentMDK:20666826~pagePK:141137~piPK:141127~theSitePK:361712,00.html>; Internet; accessed 28 April 2006.

¹⁰⁸ *Regions Servable from Turkey* [Web site] (Aksaray – Turkey Regions, 2005); available from <http://www.aksaray.gov.tr/brstanitim.htm>; Internet; accessed 24 April 2006.

C. TURKEY'S LOGISTICS SECTOR AND RECOMMENDATIONS FOR PROGRESS

1. Current Road Transportation and a Guideline for Improvement

In spite of its historical relations with the EU and its dynamic economy, Turkey's logistics infrastructure is problematic, particularly its lack of an intermodal transportation system. Turkey must expend more effort on adapting its current transportation system, which is mostly road dependent, to the projected EU transportation system aimed at transferring the heavy road loads, both passengers and freight, to railways. Transportation improvement is considerable for Turkey, but it's one of the five primary issues that must be fulfilled by EU candidates (macro stability, labor, agriculture, and the environment are the others).¹⁰⁹

Turkey's truck fleet has grown enormously and is now the largest in Europe. Its bus fleet has greatly increased as well. Today, Turkey has two thirds of all the buses in Europe: in 2000, there were 355,000 buses in Turkey as compared to 535,000 buses in Europe overall.¹¹⁰ As a result of its road-intensive policies, 94 percent of the freight and 92 percent of passengers move on highways in Turkey, whereas rail's share of passenger and freight transportation is 4.5 percent and 5.5 percent, respectively. The waterways' share of passenger and freight transportation is .5 percent and 4 percent, respectively; and airlines' share of passenger and freight transportation is 1 percent, and .3 percent, respectively.¹¹¹ In addition, the intensity of road transportation causes accidents at a much higher rate than the EU average. In 2003, for example, 67,031 accidents occurred in Turkey, in which 3,946 people died and 118,214 people were injured (see Table 6)¹¹².

¹⁰⁹ *Transport Sector Overview* [Web site] (Worldbank – Turkey, 2005); available from <http://wbln0018.worldbank.org/ECA/Transport.nsf/Countries/Turkey?Opendocument>; Internet; accessed 28 April 2006.

¹¹⁰ *Design of Passenger Seats in Vehicles* [publication online] (OTAM – Transport, 2004); available from http://www.otam.itu.edu.tr/konferanslar/OYSS/2_Cenk_Guner.pdf; Internet; accessed 3 May 2006.

¹¹¹ *Yildirim: Transport Is the Most Prepared Sector for EU* [Web site] (UBAK – Transport, 2005); available from <http://www.ubak.gov.tr/tr/alt/bulten/ab.htm>; Internet; accessed 4 May 2006.

¹¹² *Overview of Turkey Transport* [Web site] (Google – Search, 2006); available from <http://www.google.com/search?hl=n&lr=&rls=HPiB%2CHPIB%3A20015%2CHPIB%3Aen&q=transportation+eu+turkey+gurkan>; Internet; accessed 4 May 2006.

Given those statistics, the EU's expectations of Turkey are significantly high in regard to the transportation issue, especially the improvement of Turkey's railway system.

Year	1985	1990	1995	2000	2002	2003
Number of Accidents	35,243	55,771	66,029	75,201	65,748	67,031
Persons Killed	5,680	6,286	6,004	5,510	4,093	3,946
Persons Injured	51,586	87,693	114,319	136,751	116,416	118,214

Table 6. Road Traffic Accidents Profile of Turkey (From: otam.itu.edu.tr, 2006)

More than one thousand firms, using the biggest international trucking fleet in Europe, are currently operating in the international trucking business in Turkey. The trucks on international roads don't create as many traffic problems as lorries, which operate in domestic markets. Trucks are high-performance vehicles operated by logistics companies, which pay more attention to market regulations and competitiveness than do individuals. On the other hand, a majority of Turkey's road transportation problems are caused by lorries, most of which are owned by individuals, not companies. Lorries move slower than trucks and thus cause the traffic to slow down. Moreover, they cause a considerable number of accidents, whereas trucks operating internationally have very low accident rates. Turkey must somehow induce lorry owners to merge and establish companies, which will enable them to operate more efficiently. Additionally, more attention must be paid to driver training and the deterrence of traffic fines, which have been a necessary motivator for drivers to focus more on safety.

The inspection of vehicles and their drivers must be conducted in accordance with EU regulations which call for increasing the number of traffic police and using traffic inspection centers for heavy vehicles in a more effective manner. Moreover, the Ministry of Transportation and other public foundations must work in greater harmony and coordination as specified in the EU's 2004 Regular Report on Turkey's Progress towards Accession:

The staff and capacity of the Ministry of Transport need to be strengthened substantially. Regarding the social road transport acquis, the Ministry of Transport has too few qualified staff either for market monitoring or for implementation and enforcement of the licensing regime. This is particularly important for the domestic goods transport market, which is considerable in size and has never been regulated. More and better-trained experts are also needed to ensure the effective application and implementation of technical standards. The Ministry of Transport plays a key role in the road transport sector. However, responsibilities in relation to the implementation of road transport and traffic legislation are scattered over more than 10 other ministries, and authorities having a role in the implementation of the road transport acquis. This makes proper planning and coordination of activities difficult. Mechanisms for establishing more effective coordination among the ministries and streamlined decision making should be developed.¹¹³

Regulating hazardous material transportation is another essential duty for Turkey, since each year severe accidents happen due to transportation of this material using improper methods.

In the land transport sector, Turkey has started to address the important problem of the growing gap between the international and domestic parts of the road sector and has started in some areas to introduce the more stringent international rules to the domestic sector as well. Following a gap analysis, a plan for legislative alignment has been developed, which needs to be implemented. Progress has been made in the implementation of the acquis on access to the profession, the transport of dangerous goods (in international transport only), and on safety acquis (seat belts, roadworthiness tests). Improving road safety should be a priority, as Turkey's accident rates are 6 times higher than that of the EU, resulting in a very high death toll and economic losses. Effective implementation and enforcement of legislation is not yet ensured.¹¹⁴

As required by EU policies on transportation and as a necessity of the current traffic and logistics problems of the country, Turkey has to focus on railway

¹¹³ *2004 Regular Report on Turkey's Progress towards Accession* [publication online] (Europe – European Commission, 2001); available from http://europa.eu.int/comm/enlargement/report_2004/pdf/rr_tr_2004_en.pdf; Internet; accessed 27 April 2006.

¹¹⁴ *2004 Regular Report on Turkey's Progress towards Accession*. [publication online] (Europe – European Commission, 2001); available from http://europa.eu.int/comm/enlargement/report_2004/pdf/rr_tr_2004_en.pdf; Internet; accessed 26 April 2006.

transportation, which is safer and more economical than road transportation both in the domestic and the international passenger and freight sectors. However, the quality of the roads must be increased at the same time as the modernization of the railway network. This improvement includes a number of steps, such as increasing the number of traffic lanes, reconstructing roads with structural defects, and allocating more resources to the maintenance of the current infrastructure.

2. Current Rail Transportation and a Guideline for Improvement

For many years, Turkey has allocated the greatest share of its public expenditure to transportation, so as to increase its logistics capabilities in that strategic region. In that context, it has adopted many EU regulations related to transportation issues as well as several transportation projects and regulations established for European and Asian countries, in general. One of the most important projects aimed at connecting Europe to Asia via Turkey is Transport Corridor Europe Caucasus Asia (TRACECA). But the project with the greatest significance is the Marmaray Project, which includes the construction of a rail tube tunnel under the Marmara Sea in Istanbul, the only city on Earth to sprawl over two continents. As Figure 24 shows, the tunnel will allow high-capacity trains to run very efficiently between Europe and Asia (Europe is on the left side of the Marmara Sea in the satellite photo; Asia is on the right).¹¹⁵

This Project is one of the major transportation infrastructure projects in the world at present. The entire upgraded and new railway system will be approximately 76 km long. The main structures and systems include the immersed tube tunnel, bored tunnels, cut-and-cover tunnels, at-grade structures, three new underground stations, 37 surface stations (renovated and upgraded), an operations control center, yards, workshops, and maintenance facilities. Upgrading of existing tracks includes a third new track on the ground, completely new electrical and mechanical systems, and procurement of modern railway vehicles.¹¹⁶

¹¹⁵ *The Marmaray Project* [Web site] (Marmaray – Marmaray Project, 2001); available from <http://www.marmaray.com/>; Internet; accessed 2 May 2006.

¹¹⁶ Ibid.



Figure 24. The Marmaray Project (From: marmaray.com, 2006)

Turkey is also constructing two high-speed railways, between Istanbul–Ankara and Ankara–Konya, which are very crucial for effective and safe public transportation and will be an important enabler for the adaptation of EU railway regulations. Trains will have a speed of 250 km an hour and a passenger capacity of 419.¹¹⁷

The main guideline for Turkey, according to a Transport Infrastructure Needs Assessment (TINA) study is to adapt to the Trans-European Transport Networks.¹¹⁸ As Figure 25 shows, Turkey is a part of Corridor IV, which includes Dresden/Nuremberg, Prague, Vienna/Bratislava, Gyor, Budapest, Bucharest, Arad, Craiova/Constanta, Sofia, Thessaloniki/Plovdiv, and Istanbul.¹¹⁹

¹¹⁷ *Ankara–Istanbul High-Speed Train Project* [Web site] (Hizlitren – Turkey, 2000); available from <http://www.hizlitren.gov.tr/tr/hizlitren.asp>; Internet; accessed 18 April 2006.

¹¹⁸ *2004 Regular Report on Turkey's Progress towards Accession*. [publication online] (Europe – European Commission, 2001); available from http://europa.eu.int/comm/enlargement/report_2004/pdf/tr_tr_2004_en.pdf; Internet; accessed 12 April 2006.

¹¹⁹ *Trans-European Network Transport Corridors in Central and Eastern Europe* [Web site] (Green Horizon – Volume 10, 2004); available from <http://greenhorizon.rec.org/bulletin/Bull103/corridors.html>; Internet; accessed 25 April 2006.



Figure 25. Trans-European Network Transport Corridors in Central and Eastern Europe
(From: greenhorizon.rec.org, 2006)

In spite of its current modernization and improvement projects, Turkish railways comprise the worst transportation infrastructure in Turkey. Turkish State Railways (TCDD) is the only railway operator and the public foundation with the lowest profit rates in the country. Over the last twenty years TCDD had an 11 billion dollar loss. Because of the financial difficulties and improper policies, the railways have been unable to keep up with other modes of transportation in Turkey.

As a result of the land route–intense transportation policies that have been implemented since the 1950s, the length of land routes increased 80% between 1950 and 1997, but the railroads’ length increased only 11%. As for the investment shares among the transportation sectors, while land routes got a share of 50% and railroads got 30%, the share of the latter since 1985 has been below 10%.¹²⁰

One leading problem with the Turkish railways is the inadequacy of its lines. The low density of railways causes trains to run very long lines between various cities. Germany, whose population of 82 million is not much bigger than Turkey’s population of almost 70 million, has a railway network doubling Turkey’s in terms of length. Belgium has 341 meters of railway network per 1 million people, while in Turkey, only 126 meters of railway network are assigned for 1 million citizens. Figure 26 shows the low density of Turkish railways.¹²¹



Figure 26. Network of TCDD (Turkish State Railways) (From: tcdd.gov.tr, 2006)

¹²⁰ *Railways Policies throughout the 80 Years’ History of Our Republic* [Web site] (Türkiye Cumhuriyeti Devlet Demiryolları – Haberler, 2006); available from http://www.tcdd.gov.tr/tcdding/tarihce_ing.htm; Internet; accessed 4 April 2006.

¹²¹ *TCDD Demiryolu Sebekesi* [Web site] (Türkiye Cumhuriyeti Devlet Demiryolları – Harita, 2006); available from <http://www.tcdd.gov.tr/genel/harita.jpg>; Internet; accessed 4 April 2006.

Moreover, Turkish railways suffer from the fact that 98 percent of the 10,984 km network consists of single lines, which creates a huge difference between Turkey and most of the old EU member state, in particular. Only 21 percent of the Turkish railways are electrified, whereas the proportion of the signaled lines is 25 percent, as seen in Table 7.¹²²

Year		2000	2001	2002	2003	2004
TOTAL LINES	Non-electrified	8,800	8,818	8,826	8,862	8,679
	Electrified	2,122	2,122	2,122	2,122	2,305
	TOTAL	10,922	10,940	10,948	10,984	10,984

Table 7. Lengths of Lines (km) (From: 6pr.pl, 2006)

Turkey's geographic characteristics comprise another disabler for modern and effective railways, particularly in eastern Turkey due to its high mountains, for which trains need more energy to surmount and consequently reduce their speed. When the number of locomotives and passenger and freight cars are taken into consideration, the differences between Turkey and other EU members become more apparent, since this number is less than half the EU average in the country. Additionally, as Turkey's only rail operator, TCDD operates train lines that are financially inefficient. Consequently, most of the subsidies are used to compensate for the lines' financial problems, rather than to invest in infrastructure improvement.

The first measure that must be taken, therefore, to improve Turkey's railways is to restructure TCDD, since it controls the railway sector. TCDD's restructuring can best be achieved by reducing its size, improving services, and—after providing customers with an effective rail transportation—increasing prices.¹²³ The restructured TCDD must then

¹²² *Annual Report - TCDD* [Web site] (Türkiye Cumhuriyeti Devlet Demiryolları, 2006); available from <http://www.6pr.pl/pliki/3111/06.%20Gurcan%20Ozan.ppt>; Internet; accessed 5 April 2006.

¹²³ *Transport Sector Overview* [Web site] (Worldbank – Turkey, 2005); available from <http://wbln0018.worldbank.org/ECA/Transport.nsf/Countries/Turkey?Opendocument>; Internet; accessed 20 April 2006.

improve the current infrastructure by increasing the density of the railway network, building more lanes, modernizing locomotives and cars, and harmonizing the entire system in accordance with EU regulations. The 2004 Regular Report on Turkey's Progress towards Accession, in summarizing the latest situation of Turkey's railways, makes following recommendations:

Concerning the rail sector, the adoption of the action plan constitutes a good preliminary step to starting the alignment of Turkish legislation with the revised railways *acquis*. In this plan, special attention is paid to the restructuring of the entire railway sector, including the reorganization of the railway administration in line with the *acquis*. Priority must be given to setting up the necessary legislative and institutional framework for rail sector restructuring in accordance with the *acquis*. As a first step toward bringing the railway sector into line with the *acquis*, the plan focuses on restructuring the state railway company, TCDD, unbundling ports and railways, and opening the railway market to competition for freight. Subsidies paid to railway operations need to be defined in terms of a public-sector obligation and be covered by a public-sector contract. Particular attention must also be given to the rapid modernization of the rail infrastructure.¹²⁴

3. Air and Maritime Transportation

In the fields of air and maritime transportation, the EU points out, as follows, what needs to be done:

As regards air transport, no progress can be reported on legislative alignment with the *acquis*. Some Turkish air carriers started scheduled domestic flights, including to and from Istanbul, contributing to the end of the state-owned operator's de facto monopoly in the domestic scheduled flights.

Regarding maritime transport, some progress can be reported. An ambitious five-year Maritime Transport Action Plan for the enhancement of maritime safety was adopted in December 2003. This Action Plan sets out a road map for legislative alignment with the maritime safety *acquis*, measures aimed at strengthening administrative structures in the area of flag state and port state control, and training and equipment needs.

¹²⁴ 2004 Regular Report on Turkey's Progress towards Accession [publication online] (Europe – European Commission, 2001); available from http://europa.eu.int/comm/enlargement/report_2004/pdf/rr_tr_2004_en.pdf; Internet; accessed 12 April 2006.

Implementing legislation on classification societies and port reception facilities was adopted in October 2003 and March 2004 respectively. The Maritime Administration has recruited some 80 new staff as Port State Control and Flag State Implementation officers.

According to statistics for 2003, under the Paris Memorandum of Understanding, the percentage of Turkish flag vessels detained following port state control was 17.5%, a further decrease compared to the two previous years (2002: 18.8%; 2001: 24.5%). This compares with an average for EU-flagged vessels of 2.76% in 2003. Turkey still remains on the black list, in the very high risk category, of the Paris Memorandum of Understanding.¹²⁵

On maritime safety, the adoption of a comprehensive action plan covering the 2004–2008 period provides a good basis for the transposition of substantial parts of the *acquis* and the improvement of the maritime sector. The new implementing legislation on classification societies aims at ensuring their more effective monitoring.

Given that Turkey is still on the black list of the Secretariat of the Paris Memorandum of Understanding on Port State Control, improving the flag state performance of the Turkish fleet remains a priority issue. Considerable efforts are necessary to decrease the detention rates. There are still a number of Turkish flagged ships on the Commission's list of ships that are currently banned under the new European maritime safety rules. The quality and quantity of port state control must also be improved. In the Undersecretariat of Maritime Affairs, further recruitment and training of new flag State implementation and port State control officers would contribute to the development of the necessary implementation capacity. Turkey should pay attention to the necessary upgrading of port reception facilities.¹²⁶

4. Other Logistics Implementations

Warehouses should be located in the vicinity of railway networks,¹²⁷ and using railways for the transportation of goods originating from those facilities should be motivated by providing logisticians with necessary incentives. This application will

¹²⁵ 2004 Regular Report on Turkey's Progress towards Accession.

¹²⁶ Ibid.

¹²⁷ Mehmet Tanyas, *Strategies and Suggestions for Turkey's Logistics Sector* [publication online] (Atılım Üniversitesi, 2006); available from <http://ankaraem.atilim.edu.tr/sunum/mehmettanyas.ppt>; Internet; accessed 25 April 2006.

reduce the number of vehicles, which will cause, in turn, a decrease in the accident rates and traffic congestion. Moreover, required standards should be set by Turkish agencies to increase the quality of warehouses.

Proper locations for logistics parks should be determined all over the country, which will band together many facilities, like customs offices and logistics company centers.¹²⁸ The parks will reduce the time required for the preparation and approval of documents and increase the effectiveness of logisticians.

Low labor and land costs create a tendency among Turkish logisticians to built manpower-based warehouses with little automation and IT capabilities. However, the volume of trade between Turkey and the EU goes up each year. When Turkey's integration is realized, it will reach much higher levels and require hi-tech methods to control the inventory in warehouses in spite of the low operating costs of today. Thus, logistics managers in Turkey should focus on feasibility studies for the implementation of up-to-date ITs in their warehouses, while they also try to increase the in-transit visibility capabilities of their trucks using technologies such as RFID.

Turkey should improve its current internet implementations, like eGovernment, to allow its logisticians to fulfill their bureaucratic responsibilities in shorter times and follow the latest changes in regulations. In addition to state agencies, logisticians in Turkey have to give utmost importance to eCommerce, which has been growing in the country due to the current inclination of Turkish citizens to use the Internet in their daily lives.

Finally, Turkey should follow the latest developments in the EU related to transportation, such as the Marco Polo and Galileo programs. Increasing the degree of its participation in those programs will enable Turkey to keep up with the rest of Europe from a logistics perspective.

¹²⁸ Tanyas.

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V. CONCLUSION AND RECOMMENDATIONS

A. CONCLUSION

1. Logistics Differences

This study initially focused on the logistic differences among members of the EU and on possible approaches for managing those differences. The first regional difference discussed was cultural differences and their impact on logistics operations. Cultural differences are barriers to effective communication and close relationships between countries and people. Today's European Union is a mix of many different cultures, including a great variety of beliefs, customs, and languages. Language differences comprise the most distinctive cultural barrier within the EU. Another important cultural aspect is education, which provides people with new ideas and visions of the world and presents them with new opportunities in their daily lives. To further those education possibilities, the EU supports its members by funding programs that enable students and workers of member countries to study and work in other EU states.

Regional difference occurs in the area of transportation which has the highest importance among all. The volume of road transportation in Europe has increased rapidly during the last few decades, especially in the Alps and the Pyrenees where road transportation has increased during an even shorter period. Moreover, the difference between road and rail transportation is greater than in the rest of the continent and is not desired by the EU agencies trying to move heavy loads from roads to railways.

There are also significant differences among the railways of the member countries. Although trucks can easily move through the EU countries from all directions of the continent, trains do not have the same availability. For example, the new central and eastern European members have wide railway networks that are above the EU average in terms of length, but their old-fashioned trains, railways, and operating systems differ from those of most of the old members, which have a modern railway infrastructure and IT capabilities.

Another way besides railways to shift freight from the roads is to use waterways, especially inland waterways. The Rhine, the Schelde, the Meuse, the Main and the Danube are the rivers with the highest transportation capability within the EU. Those waterways form great links for the transportation of imports and exports between inland countries and large seaports of the EU.

In addition to modes of transportation, warehouses in member states with different characteristics form another group of differences in terms of a logistics infrastructure. The number and qualifications of warehouses in EU countries vary in accordance with certain determinants, such as their geographical location, remoteness to markets, the cost and capacity of labor, and their industrial infrastructure. Scandinavian members, with high labor and land costs, have warehouses using high degrees of automation, while southern members' warehouses are more man-power dependant. Additionally, new member states like Poland, the Czech Republic, Slovakia, and Hungary have been attracting direct foreign investment; as a result, new modern warehouses have been built in those countries in a short time period. Moreover, facilities like the Rotterdam port, the busiest seaport of Europe, and Schiphol Airport, the third busiest cargo airport on the continent, have created a great distribution sector in the Netherlands. As a result, warehouses with very high inventory capacities and IT capabilities have been built all over that country.

Although the EU has a common understanding of the business performance expectation of logisticians all over the continent, there are significant disparities, especially between the new and old members. Terms like "overnight air freight," the "instantaneous tracking of goods in transit," "electronic data interchange," "just-in-time," "materials resource planning," and "distribution resource planning"¹²⁹ are widely used in the European logistics arena. However, logisticians of the new members, most of which were a part of the former Soviet bloc, don't have the same level of understanding of those performance measures as the Western and Northern European logisticians do.

¹²⁹ Donald F. Wood, Anthony Barone, Paul Murphy, and Daniel L. Wardlow, *International Logistics* (New York: Chapman & Hall, 1995), 42.

Information technologies are also important for the realization of a European vision focused on mutual interoperability. The development of information technologies is directly related to countries' improvement of their economic performance and people's overall quality of life. There is a big difference among European Union countries in regard to IT investment.

In terms of human resources, there are many disparities between EU members in several aspects such as unemployment and the quality of labor. For instance, countries with the highest unemployment rate are Poland and Slovakia — two Central European countries — which have a rate of 17.2% and 15.9%, respectively, while Ireland and Denmark have the lowest unemployment rates.¹³⁰

2. The European Union's Efforts for the Improvement of the Logistics Interoperability

To reduce the unfavorable effects of the regional differences discussed here on logistics operations across the continent, the EU has issued many regulations. Most of them aim to provide member countries with an interoperability of transportation systems by improving the current infrastructure and unifying the national transportation regulations. The most significant measure to be taken by the members and candidates under the guidance of those regulations and the current EU policy is to expand the capacity and modernize the infrastructure of railways and transfer the heavy loads of trucks to trains. In doing so, the entire EU region will have a safer, more environmentally friendly, and more effective transportation system. Inland water transportation is another area to be improved by the EU countries that have the capability of moving vessels through the waterways, since it's easy to move goods using this mode of transportation in a safe and effective manner.

Other than transportation, several processes and bureaucratic applications related to logistics operations have taken place in the areas of interest of the EU agencies. In spite of the opportunity for free movement of goods, EU countries still have their own

¹³⁰ *Harmonized Unemployment* [Website]; available from http://epp.eurostat.cec.eu.int/portal/page?_pageid=1996,45323734&_dad=portal&_schema=PORTAL&screen=welcomeref&open=/euro_lm/lm_un&language=en&product=EUROIND_LM&root=EUROIND_LM&scrollto=0; Internet; accessed 8 March 2006.

border requirements which can deteriorate international supply-chain efficiency within the Union.¹³¹ Thus, EU regulations and policies call for an optimal deployment of logistics resources to provide a well-organized movement of goods and passengers with the help of unified logistics implementations in member states.

3. A Case Study: Turkey

Comprehending the analysis of regional differences within the EU and its regulations and policies on logistics issues, Turkey must put more effort into improving its transportation infrastructure and adapting the unified logistics processes of the EU. This improvement is a necessity of the long-lasting EU–Turkey relations which were reinforced in 2004 by the commencement of formal EU–Turkey negotiations for accession. Turkey’s strategic location in the middle of many trade zones and different continents and its flourishing economy, the biggest in the region, are other factors necessitating Turkey’s investment in the logistics area.

Turkey must improve its intermodal transportation capabilities by increasing its share of rail freight and passenger transportation in the entire transportation sector. This can be achieved by restructuring the Turkish State Railways (TCDD), increasing railway density, modernizing locomotives and rail cars, and harmonizing the entire rail system in accordance with EU regulations. In addition to improving the rail sector, Turkey must improve the quality of its roads by increasing the number of traffic lanes, reconstructing roads with structural defects, and allocating more resources to the maintenance of the current infrastructure. Turkey has a huge truck and bus fleet on the roads, which causes Turkey to have the highest accident rate in Europe. Moreover, Turkey has to take the necessary precautions in air and maritime transportation that were declared in the EU’s 2004 Regular Report on Turkey’s Progress towards Accession. Turkey should focus on maritime transportation safety issues in particular.

Improving the quality of warehouses and establishing logistics parks within the country are two other important logistics concerns for Turkey. Additionally, Turkish

¹³¹ Richard K. Bank, *Can Europe Shed Its Shackles?* [publication online] (Vision, 2006); available from http://www.catlogistics.com/s_vision/vision_winter05_2-4_viewpoint.html; Internet; accessed 26 April 2006.

logisticians should conduct feasibility studies for the implementation of up-to-date ITs in their logistics operations. And Turkish agencies should increase the degree of their participation in the latest IT developments in the EU, such as the Marco Polo and Galileo programs.

B. RECOMMENDATIONS FOR EUROPEAN UNION CANDIDATES

Learning the logistics differences among the member states of the EU and policies and regulations on the improvement of the EU's logistics system, and finally by judging themselves in comparison with Turkey, EU candidates can consider the following main recommendations, in addition to suggestions mentioned in other places of the study, in order to improve and unify their logistics systems.

1. Interoperability of transportation systems is the most important enabler of the effective logistics operations within the world's second biggest economic entity. Candidate countries have to understand EU's current efforts on the development of infrastructure and the unification of member nation transportation regulations. Because Europe's roads are heavily used and congested, the national rail and inland water transportation systems must, and are expected to have the ability to shift loads away from roads.
2. Cultural differences play a greater role in logistics operations than most people think. In order to avoid the negative effects of those differences, candidate countries should focus on ways of decreasing language barriers first of all. Accordingly, they should understand the cost and complexity of communication in the mix of many languages and take precautions in advance by educating the labor force in the linguistics arena in accordance with the EU programs which are trying to bring to EU citizens the capability of speaking at least two additional languages.
3. Candidate countries should have logistics parks with company and customs offices and use a high degree of eBusiness and eGovernment applications in order to complete bureaucratic procedures in short periods. The effective use of those internet tools requires countries to motivate their citizens to have internet connections both in their households and work places by providing them with incentives. Additionally, their warehouses should have the necessary IT capabilities to meet the requirements of high volume-trade in the EU which is increasing significantly each year.
4. Candidates should find the ways of joining EU programs such as Galileo and Marco Polo in advance which are useful for efficient logistics operations.

5. To get ready for the appropriately utilized human resources, European Union candidates should provide their citizens with necessary jobs and guarantee equal opportunities for everyone who wants to work. Additionally, they should focus on the quality of the labor force and educate and train them as required by EU standards.

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